FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor : STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 1019. (No. 27. Vol. XX.) JULY 5, 1928 [Weekly, Price 6d. Post free, 7d.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2.

Telephone: Holborn 3211. Telegrams: Truditur, Westcent. London.

Annual Subscription Rates, Post Free.

United Kingdom .. 30*s.* 4*d.* Abroad .. .. 33*s.* 0*d.**

* *Foreign subscriptions must be remitted in British currency.*

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1928

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July 19 .... Air Display at Colchester

July 20-21 King's Cup Race and Siddeley Trophy Tour, Hendon

July 20-22 Light Plane Meeting at Rotterdam

July — .... Aerial Derby

Aug. 4 .... Close of *Philadelphia Bulletin* Atlantic Flight Prize

Aug. 6 .... Air League Challenge Cup, Norwich

Aug. 27-31 U.S. National Baby 'Plane Meeting, Milwaukee

Oct. 7-28 International Aircraft Exhibition, Berlin

Oct. 8 .... Aero Golfing Soc.—Team Match v. Stage G.C.

Oct. 24 .... Aero Golfing Soc.—"Cellon" Challenge Cup

1929

Oct. 31 .... Guggenheim Safe-Aircraft Competition Closes

EDITORIAL COMMENT

IT is always easier to criticise than to praise, and when the greatest and most spectacular flying event of the year has just taken place it is, most people will admit, the duty of FLIGHT to be as critical as possible and to point out any matter, great or small, in which the Royal Air Force Display seemed to be lacking or to be capable of improvement. It is only when one approaches the display of 1928 in this spirit that one realises how very nearly perfect it was. The fact that fragments of the blazing kite balloon set fire to part of the oil refinery before the bombers got to work on it is hardly a matter for criticism. In fact, only one item on the programme did not produce its full intended effect, and for this comparative failure it would hardly be fair to blame the organisation. The item in question was the artillery observation. It was not the fault of anybody that quite a number of spectators thought that the Bristol machine was dropping bombs on the enemy gun. It was just sheer bad luck that the shell which ought to have destroyed the gun proved to be a dud. But it would have been better if the friendly battery had been located beyond the railway line, so that the observation aeroplane could have manœuvred in front of the spectators instead of behind them.

The R.A.F. Display

This was absolutely the only item which lacked the success of the rest of the programme. For all the other items we have nothing but praise. Everyone who has watched the Display each year since its beginning must realise the difficulty of ringing the changes and finding something novel year by year. This applies particularly to aerobatics and air fighting. This year the selection was made with consummate skill. There was not too much "stunting," and what there was was excellent of its kind. A crowd now is not very much interested if a number of aeroplanes are turned loose in the sky to tumble about at their good pleasure. This mistake was avoided. The two Lynx-Avros, the single Gamecock, and the two Genet-Moths, each in turn, gave a well considered display of aerobatics in which each

manœuvre was carefully selected and each told its own tale. As a result, not only were the populace delighted by the spectacle, but the people who understand the points of good flying found in these turns that keen pleasure which only the expert can experience. We are not in a position to quote what the foreign parties of flying men, the Italians, French and others said about it ; but we did hear the opinion of an officer of the Royal Australian Air Force Reserve, a man who flew Bristol Fighters during the war and afterwards carried the air mail between Perth and Derby, and his critical delight at these aerobatics simply knew no bounds.

Two points about this year's programme are especially pleasing. Both the Coastal Area and the Auxiliary Air Force took part in the Display, and did their part right well, too. Both have participated before, and it is to be hoped that their appearance at Hendon will henceforth be a regular thing. It should be a matter of the greatest satisfaction to every citizen to see how well the citizen pilots fly their machines and keep formation ; and we beg to offer our congratulations to the squadrons from the County of Warwick, the County of London, and the City of London. We hope that they will soon be equipped with more up-to-date bombing machines.

Mention of the Coastal Area brings us to one of the constructive suggestions which we should once again like to make. Would it not be possible to organise a separate seaplane and ship-plane Display at some place like Cowes ? Doubtless it would have to be done in conjunction with the Admiralty, but if that could be arranged, there can be no doubt that the Display would be very beautiful and very popular. Flying-boats, deck landings, float seaplanes, amphibians, and torpedo-planes offer a great and attractive variety. Ordinarily it might follow on Cowes Week, or the Clyde yachting week ; but for next year we are of the opinion that a seaplane Display most certainly ought to be arranged in connection with the meeting for the Schneider Cup. The Navy played its part last year by sending H.M.S. *Eagle* and a number of destroyers to Venice. That should make a good precedent for more energetic co-operation next year.

We should like to make an additional suggestion for some future Hendon Display, before leaving the subject of the Coastal Area. Once before the set piece was concerned with ships at sea and fleet-spotters and bombers. Would it be impossible to build up at Hendon a dummy aircraft carrier with a "practicable" landing deck, and show aircraft actually taking off from the deck ? That would be a novel sight for the great majority of the crowd and it would be a very instructive object lesson as well. We do not wish to suggest reckless extravagance, but the takings at Hendon each year justify some outlay on varying the programme from year to year in order to make it attractive. There is just a fear that the ordinary bombing of some fort or factory may soon begin to pall ; and though the police may be delighted to see a number of cars leaving the ground before the last event is over, the committee cannot desire that that should happen because the last event is considered unattractive. Moreover, the educative element in the Display should never be lost sight of, and the work of our aircraft carriers ought to be appreciated by the taxpayers. Of course we do not suggest that all the latest secrets of the carriers should be divulged, but it would be easy to avoid doing that. It would also be possible to use amphibians to show how seaplanes can be lowered over the side so as to take off from the "water." But whether this idea is approved or not, we will end by urging once again that a seaplane and ship-plane Display in connection with the Schneider Cup ought to be very seriously considered.

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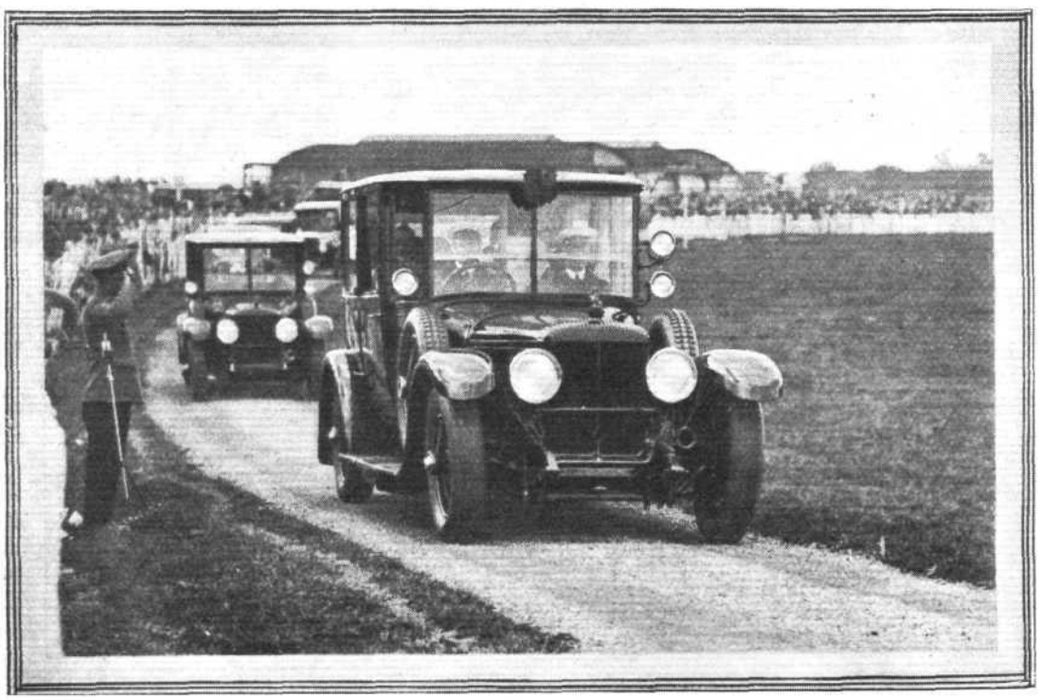
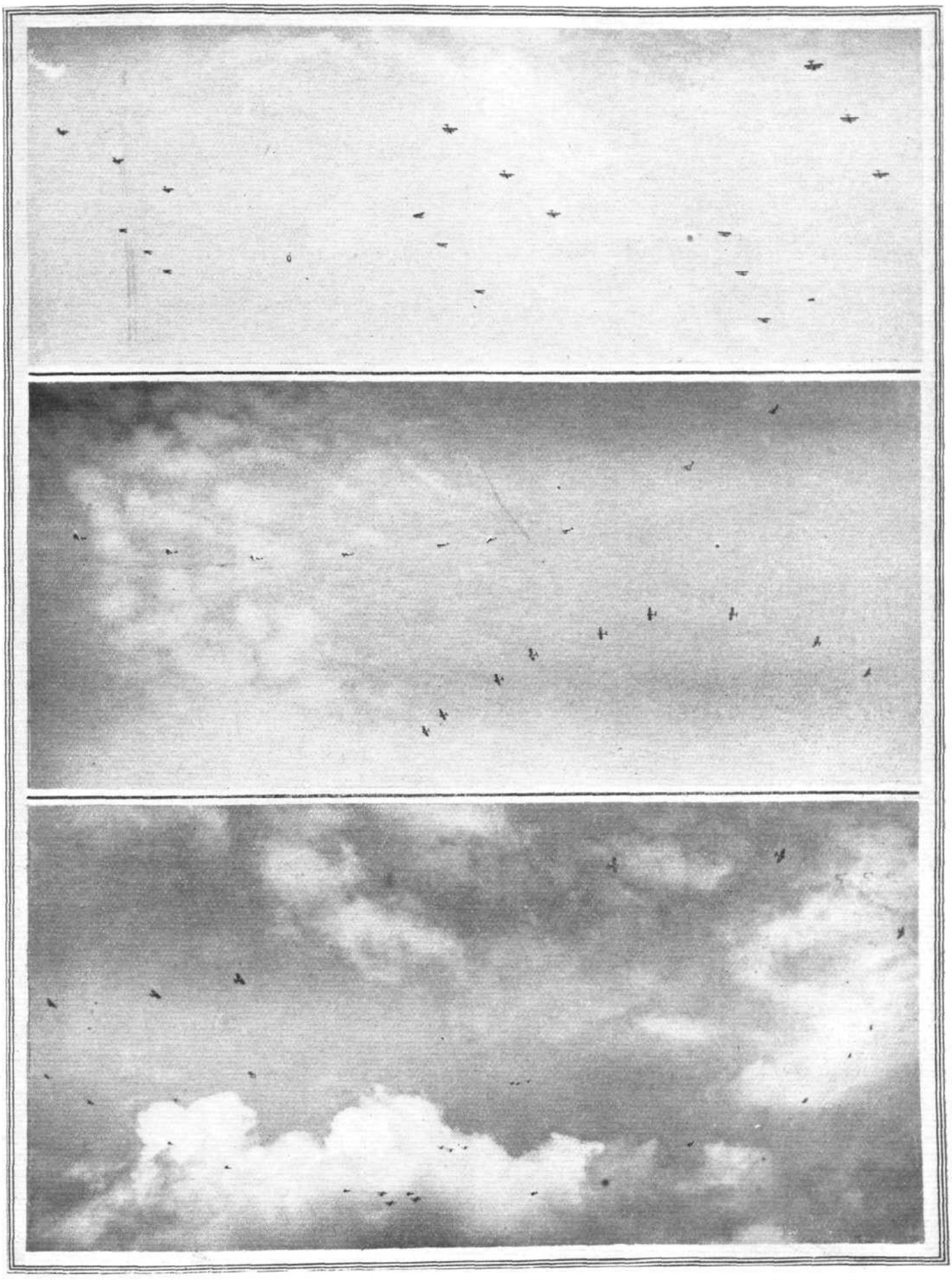
SEE PP. 535—579 FOR BRITISH AIRCRAFT AND AERO ENGINE SPECIFICATIONS AND PARIS SHOW REPORT.



R.A.F. Display : Arrival of their Majesties the King and Queen. The Royal Car passing the enclosures at a slow pace. With their Majesties was the King of Spain and the Duke of York.

["FLIGHT" *Photograph*



["FLIGHT" *Photographs*

AIR FIGHTER EVOLUTIONS : Armstrong-Whitworth " Siskins " (Jaguars) belonging to Squadrons Nos. 19, 29 and 56, at wing evolutions. Two squadrons formed a large circle and the third squadron dived through it (see below).

ROYAL AIR FORCE DISPLAY

THE ninth annual Royal Air Force Display was held on June 30 at Hendon, before their Majesties the King and Queen and a crowd estimated at 150,000. Rain fell in short sharp showers at the beginning of events, but for the main part of the interesting programme during the afternoon a blue sky patched with ballooning clouds hung over Hendon aerodrome and the sun sparkled on the whole spectacle. By noon a large crowd had already gathered to witness the early events.

The first item was a race of approximately 14 miles between officers from each of the training centres which carry out annual training of officers on the Reserve of the R.A.F.—namely, London (De Havilland Aircraft Co., Ltd.), Bristol (Bristol Aeroplane Co., Ltd.), Coventry (Sir W. G. Armstrong, Whitworth Aircraft, Ltd.), Glasgow (William Beardmore and Co., Ltd.), and Leeds (North Sea Aerial and General Transport, Ltd.).

All the pilots flew Avro-Lynx machines and started in the rain and low clouds. They finished in close order, only eight seconds separating the first machine and last machine. Flying Officer C. E. M. Pickthorn, M.C., representing Leeds, was the winner, his time being 8 mins. 52 secs. Flight-Lieut. H. Bligh (Coventry) was second, Flying Officer F. J. Brunton (Bristol) third, Flying Officer R. P. Mollard (Glasgow) fourth, and Flying Officer G. F. Court (London) fifth.

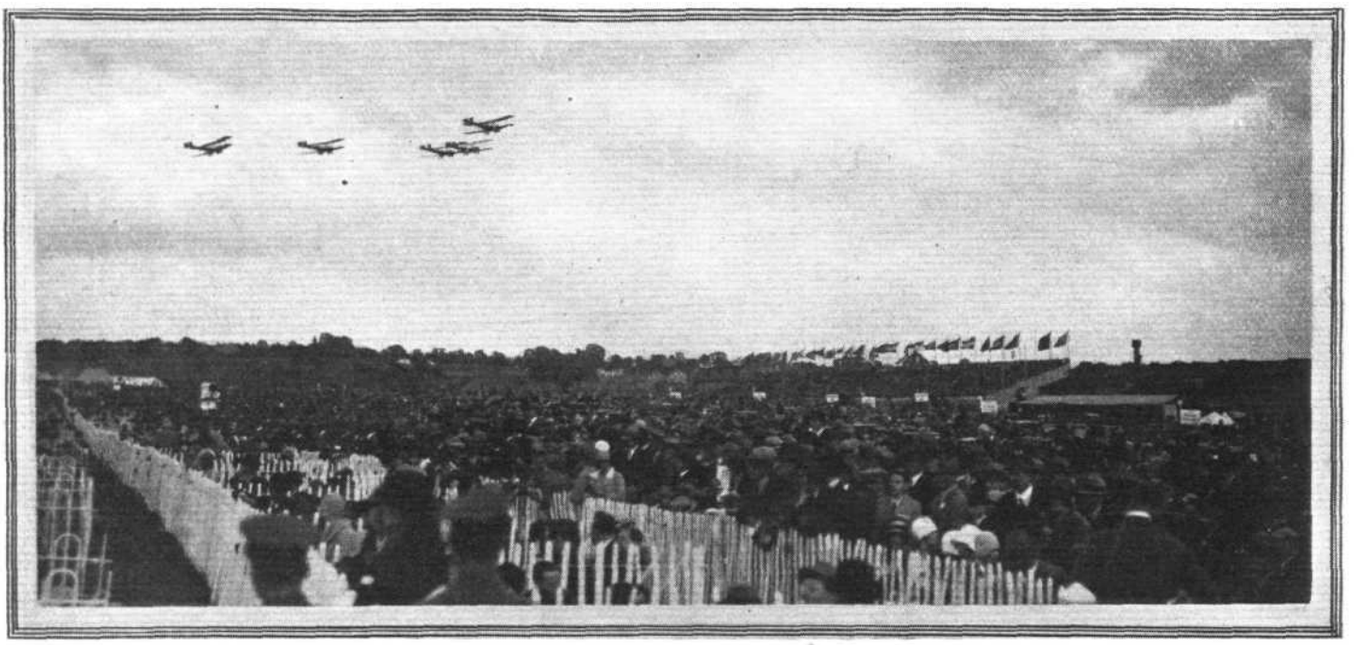
The next event was an exhibition of individual aerobatics by Flight-Lieut. F. K. Damant, D.F.C., and Flying Officer C. S. Staniland, of No. 41 (Fighter) Squadron, on Armstrong-Whitworth "Siskins" (Jaguars). They took it in turns to perform their manœuvres and also acted simultaneously, looping together at low altitudes and finally landing together. Their individual displays were given at each end of the long line of enclosures.

A Handicap Race of 28 miles then followed for the Cup presented by the Duke of York. The pilots represented the Air Ministry and each Headquarters Command in England. An interesting aspect was lent to the event by the variety of the machines, which were Armstrong-Whitworth "Siskin," Gloster "Gamecock," Hawker "Woodcock," Fairey "Flycatcher," Fairey "Fox," and D.H. "Moth." The machines started off in rain, but the weather cleared whilst they were on the course. They passed over the aerodrome once when the D.H. "Moth" was leading and the Fairey "Fox" was last, which, incidentally, was their order of starting. At the finish the Fairey "Flycatcher," piloted by Flight-Lieut. E. F. Waring, D.F.C. (Coastal Area), was first, followed by the "Siskin" and "Woodcock," flown by Flight-Lieut. A. H. Orlebar and Flight-Lieut. D. S. Earp respectively, who dead-heated. The "Gamecock" (Sqdn.-Ldr. A. Gray) was next, then came the "Fox" (Flight-Lieut. H. F. V. Battle), and finally the "Moth" (Flying Officer R. A. Taaffe). Only two seconds divided the winner from the second pair.

This race was followed by a demonstration of the slotted wing at about 1.20 p.m., the pilot being Flight-Lieut. D. S. Don, of No. 24 (Communication) Squadron, who often pilots the Prince of Wales for his rush engagements.

A very stiff breeze prevailed when the D.H. "Moth" took off and floated at slow speeds very low and near to the enclosures, giving a convincing display to the public. It hung at moments on its nose stationary, and it floated down with the engine nearly off from a considerable altitude with very little forward movement. The descent was comparatively slow too, and the machine remained clearly stable all the while. It was a good exhibition, which included a low loop and low flat turns.

An Air Combat next thrilled the crowd. Two "Siskins" of No. 32 (Fighter) Squadron were piloted by Flight-Lieut. S. T. B. Cripps and Flying Officer J. C. H. Tavendale respectively. This seemed to be a demonstration of an experienced fighter attacking a novice, for one of the "Siskins" tried his best all the time to get on the tail of the other who careered round trying to shake his unhealthy intruder off. He did not succeed, however, and was finally brought down in "flames," which he did in very realistic fashion, trailing a curving stream of smoke in his spiralling descent and final long dive out of sight. Meanwhile his victor soared above, clearly elated by his "dastardly" work, for he could not refrain from diving and zooming, looping very low and flying upside-down before coming to earth.



["FLIGHT" *Photograph*

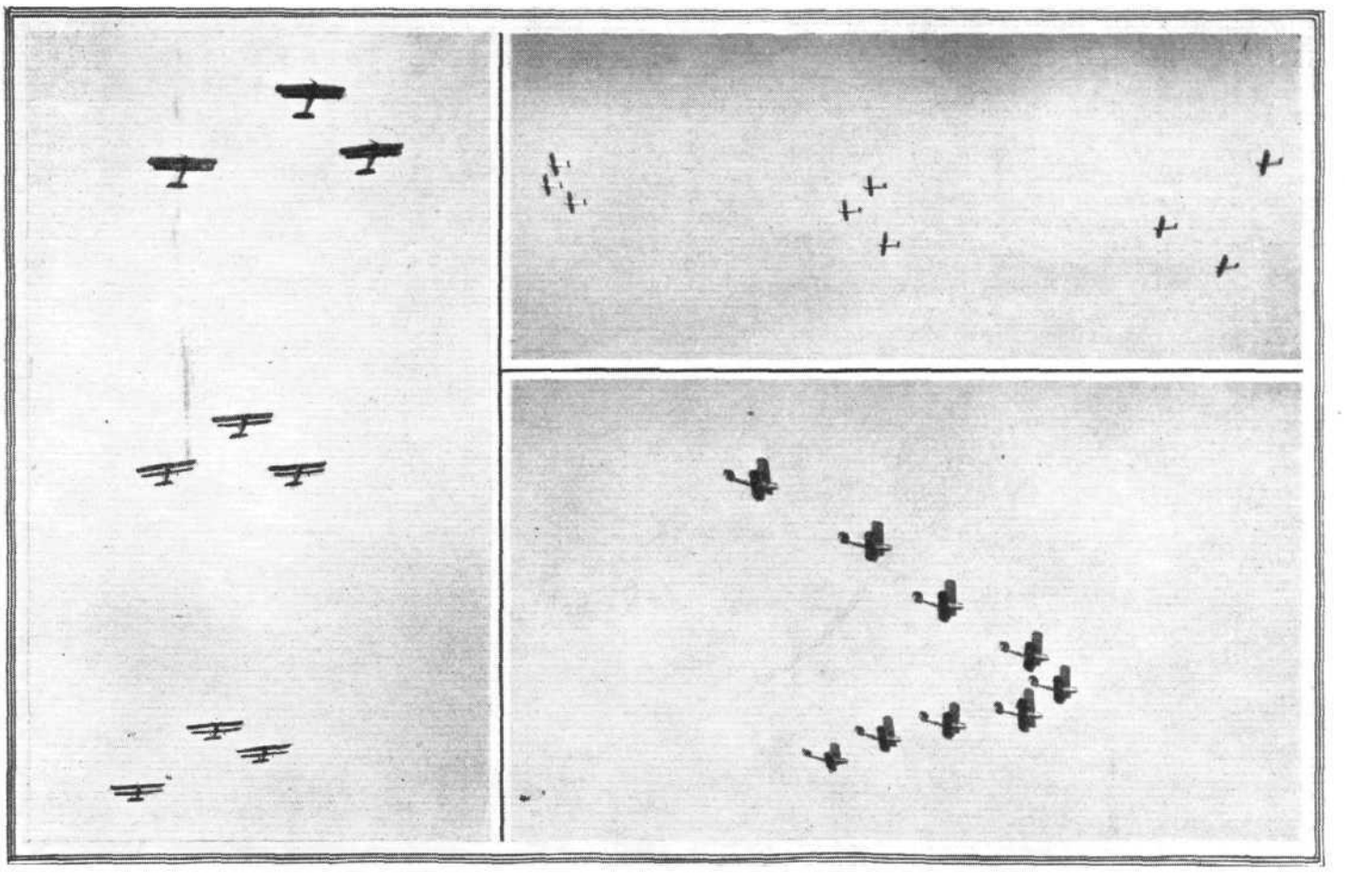
AIR FORCE DISPLAY: A general view of the crowd which was estimated at 150,000. Above is a flight of night bombers passing over during one of the events.

The next item was a competition for climbing between four "Siskins," three with supercharged "Jaguars" and the other with an unsupercharged "Jaguar," representing Nos. 1, 32, 41, and 111 Squadrons. The start was temporarily delayed owing to the low clouds. It was expected that 17,000 ft. (over three miles) would be reached in the 15 minutes but the winner, Pilot Officer T. J. Arbuthnot (No. 41), touched 19,500 ft.

His "Siskin" was one of the supercharged "Jaguars."

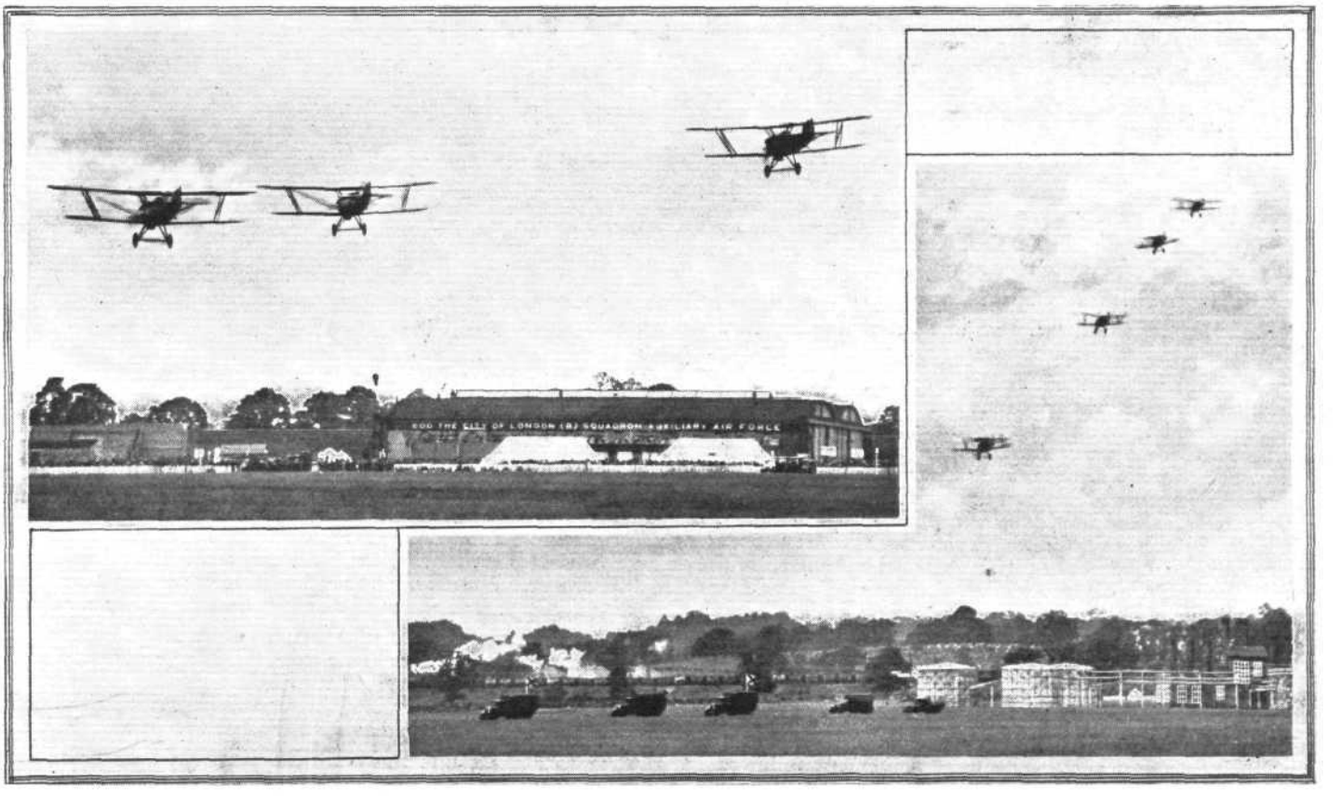
The second place was won by Flying Officer H. W. Charnock (No. 32) on the unsupercharged "Siskin," who reached 16,000 ft. Third place went to Flying Officer H. G. Loch (No. 1), who touched 14,000 ft. It was announced that the clouds caused the difference in the altitudes attained.

Whilst the machines were engaged in the altitude race the next event was started. This was a demonstration shoot. On the aerodrome was a long-range gun belonging to the "enemy," which was supposed to have recently gone into action and been located by air photography. A battery of



["FLIGHT" *Photographs*

AIR FORCE DISPLAY: Hawker "Horsleys" (left) Fairey IIIF's (top) and Fairey "Foxes" (below) at drill movements in formation. Each Squadron passed in succession from different directions performing similar drill orders.



["FLIGHT" *Photographs*

DISPLAY FEATURES: (Top left) Fairey "Foxes" diving over the enclosures to demonstrate low bombing at speed. (Right) Armstrong-Whitworth "Siskins" (Jaguars) diving in line ahead formation to open fire on the enemy transports crawling over the aerodrome.

our guns from a distance endeavoured to destroy it with the aid of a machine spotting its shots and reporting by telegraphy with the "clock system."

This machine was a Bristol Fighter, and as the shots fell round the enemy gun its Morse signals came through distinctly on the loud speakers, easily enabling those with a knowledge of Morse to pick them up. The loud speakers also informed the public in the common language the distance the shots fell, although these were mostly obviously good, and although a direct hit was not observed it was clear that the enemy gun was easily put out of action. One heard the observations coming through as 200 yards N.W. of the target, then 100 S.E. and 100 N.E., etc. This was a most interesting event, for it had a close resemblance to stern reality. There was an impressive screeching noise, imitating the shells passing over, and then followed the explosions at the correct time, with a shower of earth shooting up amidst fire and smoke.

Aerobatics.—There was another display of individual aerobatics, but this time on Avro-Lynx machines. The pilots were Flying Officer C. H. G. Bremridge and Flying Officer G. E. Campbell, both of No. 2 Flying Training School. They stunted at each end of the crowd, but their most thrilling manœuvre was when they dived at each other, passed, zoomed, and then looped or rolled or flew upside down, each machine performing the denouement simultaneously. Ground flying was also expertly carried out.

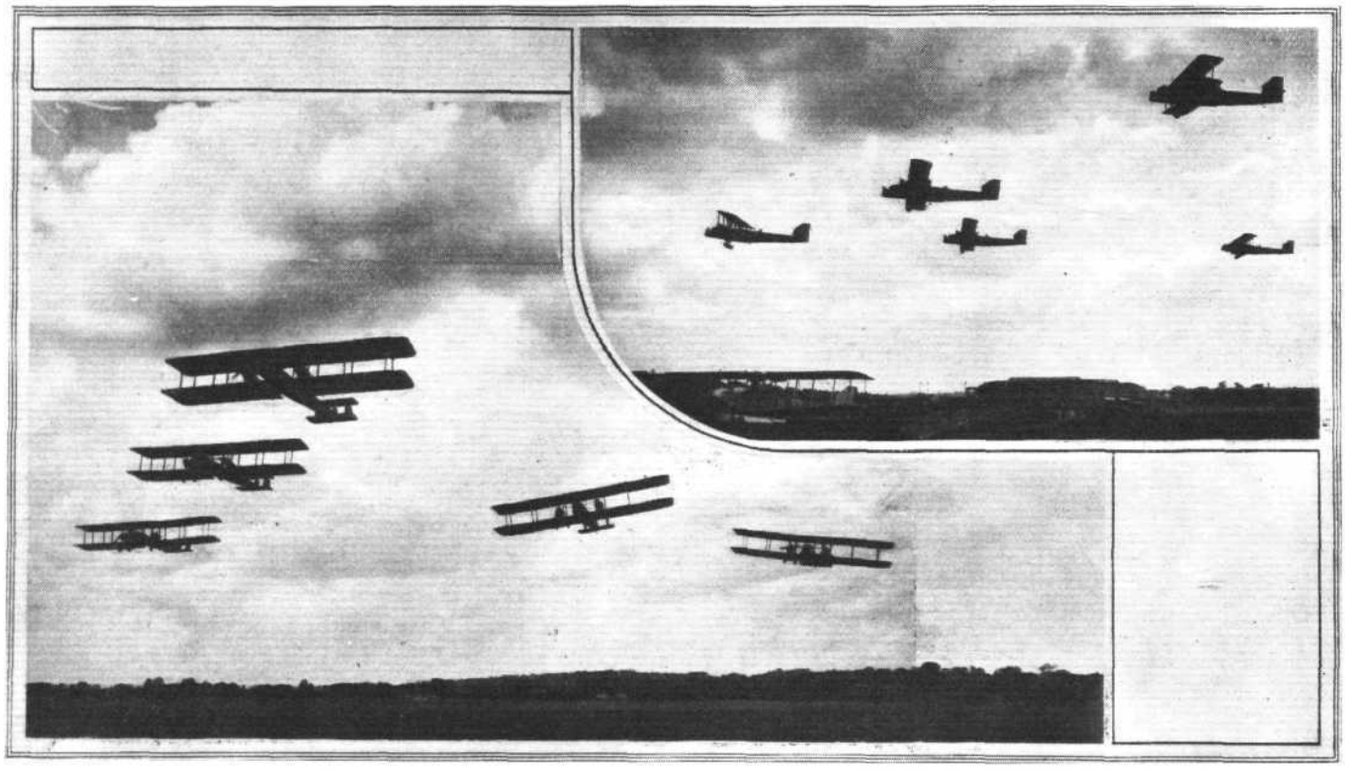
Main Programme.—The main part of the programme then began. Three day bombing squadrons drilled. The machines were Hawker "Horsleys" of No. II Squadron, Netheravon, led by Sqdn.-Ldr. P. H. Cummings; Fairey "Foxes" of No. 12, Andover, led by Sqdn.-Ldr. T. E. Salt; and Fairey IIIF's, of No. 207, Eastchurch, led by Sqdn.-Ldr. J. B. Graham. The "Horsleys" took off first, followed by the IIIF's and the "Foxes." Each did similar drill movements over the aerodrome in that order, approaching from different directions. The "Horsleys" flew towards the enclosures in closed vee formation, then the IIIF's flew parallel to the enclosures, and the "Foxes" came in over our heads. The next movement followed in succession was open formation, then each came in flights of three's in line abreast with the first trio leading. Finally all squadrons crossed together in formation.

Air Attack.—This was an attack on a moving target, which, in this case, was a line of enemy transport comprising five vehicles. As they crawled obliquely across the aerodrome five fighters of No. 25 Squadron approached the aerodrome, dived to attack in single file with machine-gun fire, then zoomed away. This scattered the transports, and one was crippled so badly that it had to be left behind, a ready target for further fire. Again the fighters came in, this time in open inverted vee formation, and a converging onslaught followed. From all degrees of the compass the fighters dived on the helpless transport, dropped bombs, and zoomed aloft to turn and dive again in their proper order. The small pellets dropped burst into smoke. Considering the speed at which this bombing was done and in a diving position only a few feet off the ground, the shots were very good. Finally the transport was blown up.

Advanced Training.—One of the most spectacular events was undoubtedly that by Flight-Lieut. R. H. Horniman, Headquarters, R.A.F., Kenley, on a Gloster "Gamecock" with wings of scarlet which flashed so effectively against the deep blue sky which mantled the aerodrome at the time. His object was to demonstrate advanced individual training, and he certainly succeeded. He started off towards the enclosures, zoomed above them, and turned to get back over the aerodrome for his first stunt, the loop. This was followed in turn by a half-roll on top of the loop, which enables a pilot to gain height and emerge going in the opposite direction; then came a half-roll, useful for a quick reversal of direction of travel, the slow roll, stalling turn, and a spectacular upward slow roll. Against the blue background the "Gamecock" spun upward with ease. The most thrilling item in this pilot's exhibition was the "rocket." Approaching the enclosures at a low height, he suddenly shot upwards in a swift, straight, and almost vertical climb and continued until he must have been nearly 2,000 ft. high. This movement is useful for a single-seater machine when engaging a bomber, for it can fire underneath in a position almost immune from the bomber's return fire.

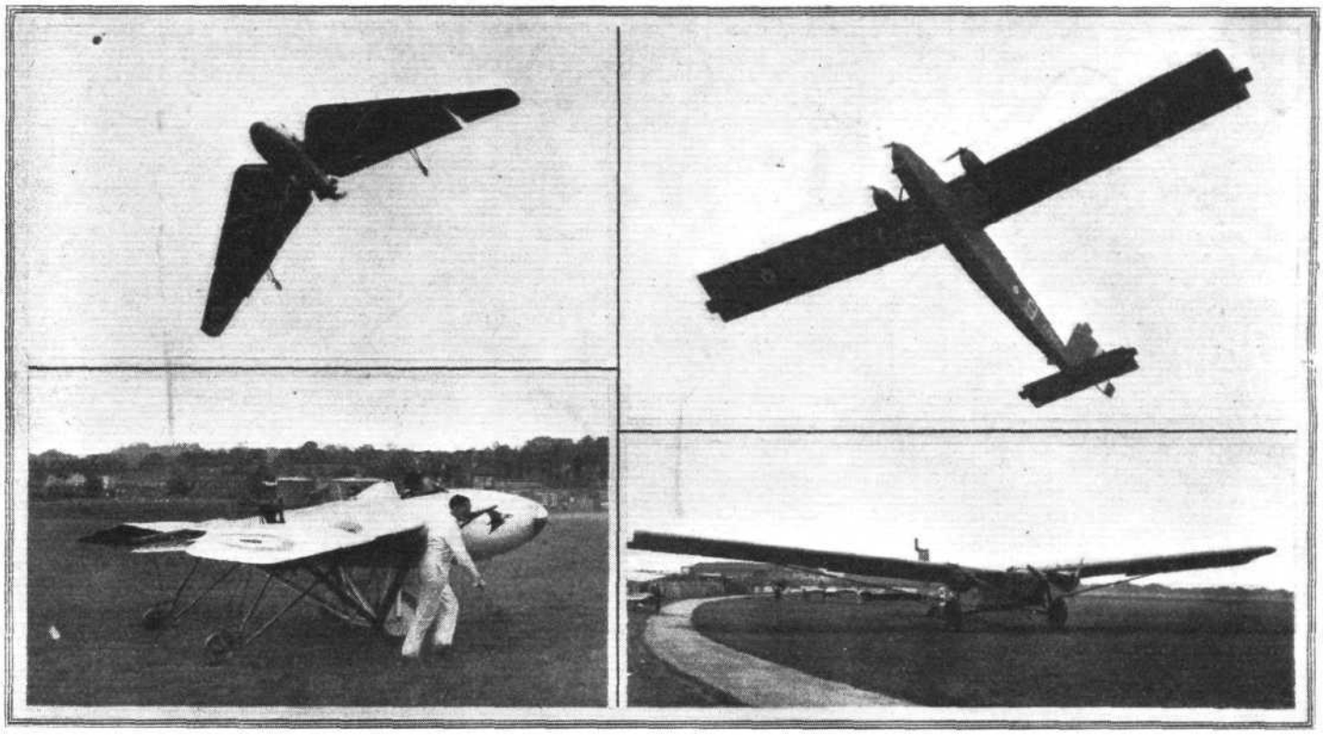
Battle Flight Competition.—The alarm was given that bombers were approaching the aerodrome. They were D.H.9a's of No. 605 (County of Warwick) Bombing Squadron. Three flights of fighters took off at a moment's notice to attack, but the bombers seemed to get over the aerodrome before they were met. The fighters belonged to Squadrons Nos. 32 ("Gamecocks"), 1 and 111 ("Siskins"). A flight of "Siskins" (No. 111) won the event, which was to demonstrate quick interception of enemy bombers.

Evolutions.—This demonstration by fighter squadrons equipped with "Siskins" was one of the best events of



"FLIGHT" *Photographs*

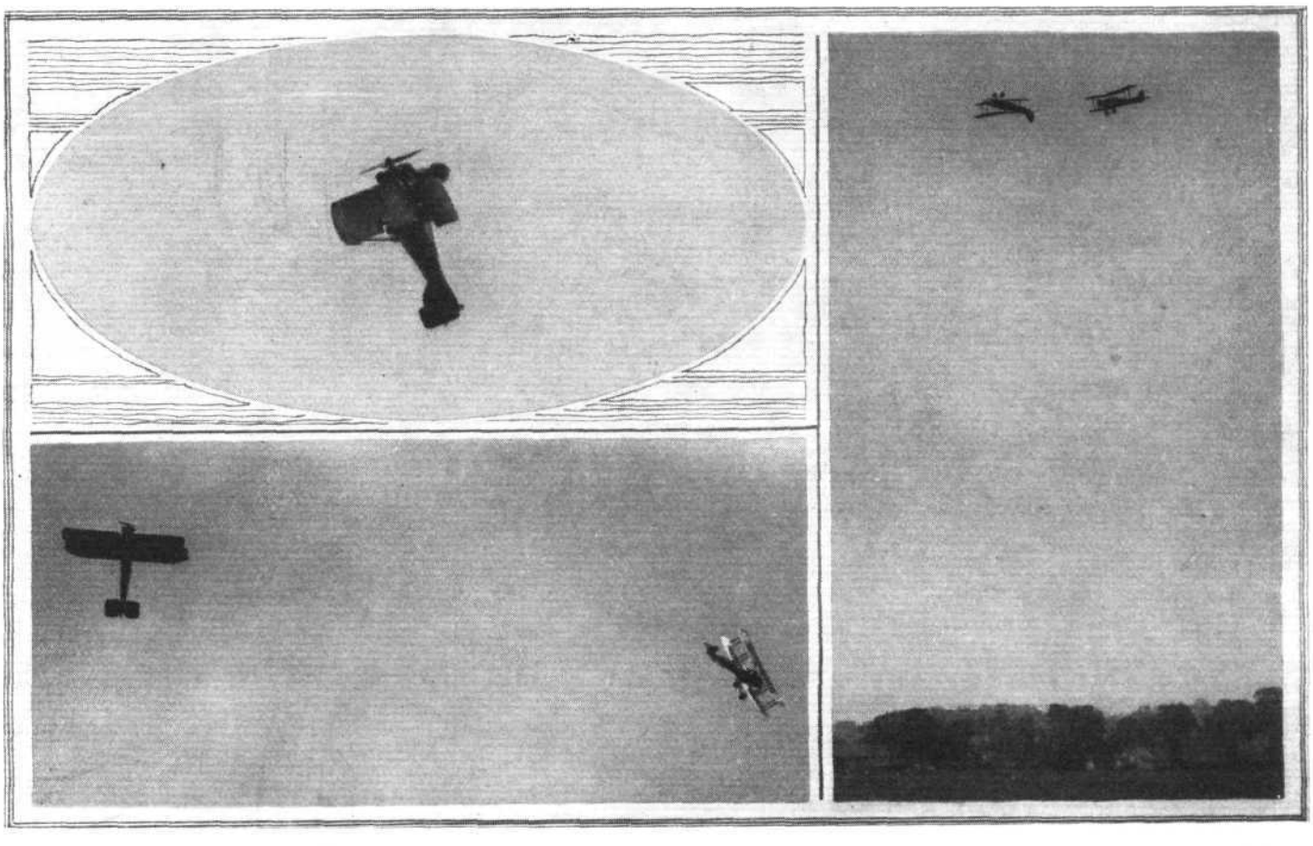
NIGHT WORK: Vickers' "Virginia" night bombers, taking off in formation, and (above) Handley Page "Hyderabad" night bombers passing in open formation during the fly-past of night bombers.



"FLIGHT" *Photographs*

EXTREMES : (Left)—Pterodactyl (Genet) in flight and (below) taxi-ing past the enclosures during the parade. (Right)—Beardmore "Inflexible" (Condors) in flight, and (below) leading the parade.

the day. No. 56 Squadron led by Sqdn.-Ldr. A. Lees was equipped with radio-telephony, and the leader's orders were heard by the public from the loud speakers. Some people may have been a little confused when the squadron that happened to be passing over did not respond to the order that had just come through. That was because only the



["FLIGHT" *Photographs*

STUNTING AT HENDON : (Top left)—The Gloster "Gamecock" resisting gravity over the aerodrome with the help of Flight-Lieut. Horniman. (Below) Avro-Lynx machines flown by Flying Officers Bremridge and Campbell of No. 2 Flying Training School. (Right) Two D.H. "Moths" crossing the aerodrome wing to wing, one inverted and the other in normal position. Their pilots were Flying Officers Boyle and Atcherly.

squadron mentioned had radio and responded to radio orders. Two of the squadrons of 9 machines each circled the aerodrome following the leaders, then joined and thereafter 18 machines maintained equal distance in a good circle. Then, through the centre and towards the enclosures, dived the other squadron of fighters, led at a considerable distance in front by Wing-Comdr. W. S. Douglas. Sqdn.-Ldrs. H. W. G. Jones and M. L. Taylor led Nos. 19 and 29.

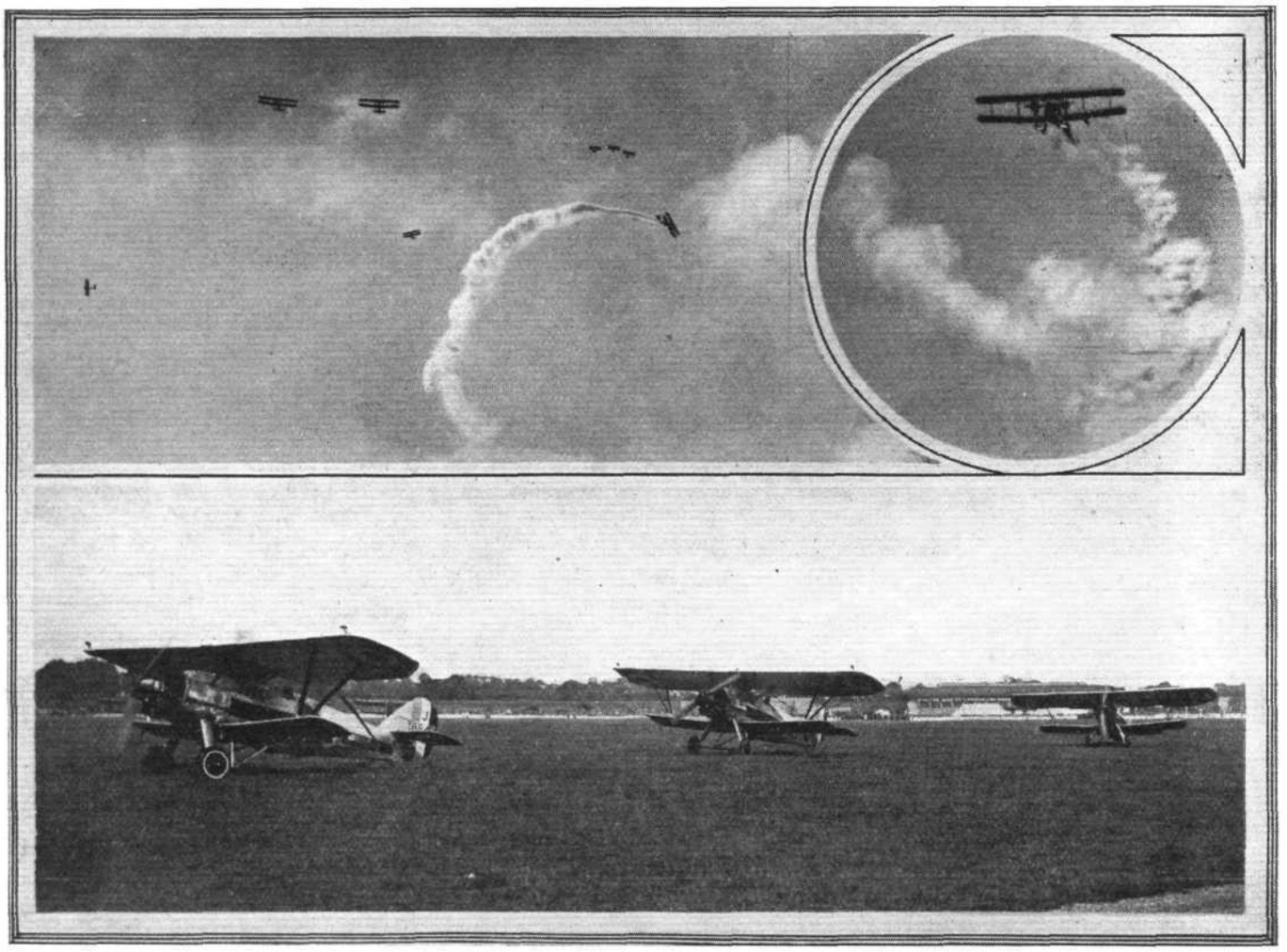
Parade.—This event raised much enthusiasm and wonder amongst the public, who were particularly delighted when the Beardmore "Inflexible" monoplane (Condors) took off, piloted by Sqdn.-Ldr. J. Noakes. That machine led the parade, and in turn came the Boulton and Paul "Partridge" (Bristol "Jupiter"); Hawker "Hawfinch" (Bristol "Jupiter"); Bristol "Bulldog" (Bristol "Jupiter"); Westland "Wizard" (Rolls-Royce "Falcon XI"); Fairey "Fox" (Rolls-Royce "Falcon XI"); H.A.C.I. (Bristol "Cherub"); D.H. "Tiger-Moth" (D.H. Engine); Vickers "Vellore" (Napier "Lion"); Blackburn "Ripon" (Napier "Lion"); Boulton and Paul "Sidestrand" (Bristol "Jupiters"); Handley Page "Hinaidi" (Bristol "Jupiters"); and the Westland "Pterodactyl" (Armstrong-Siddeley "Genet"). After the machines had taxied along the enclosures each took off, all except the "Inflexible" giving the public an interesting thrill by keeping the nose down until the last safe moment, and then zooming over their heads. They circled the sky, revealing their distinctive outlines and speeds, and finally made perfect landings. The speeds of the four new single-seater fighters were particularly impressive and the flipping round of the curious "Pterodactyl" delighted the public. The Supermarine-Napier S.5 remained in the machine park.

Ascent of Bombing Squadrons.—Massed take-off and massed flying are always impressive, and so the take-off of Vickers "Virginias," Handley Page "Hyderabads," Fairey "Foxes," Hawker "Horsleys" and Hawker "Woodcocks," representing Squadrons Nos. 7, 58, 10, 99, 12, 11, 3 and 17, made an interesting event. They were led by Wing-Comdrs. A. Portal, E. W. Norton, H. R. Busteed and B. E. Smythies, and Sqdn.-Ldrs. T. E. Salt, P. H. Cummings, E. D. Johnson and A. R. Arnold.

Low Bombing.—Fairey "Foxes" gave an intimate exhibition of low bombing at speed without dropping bombs. The effect of their low dives over the enclosures was, however, more effective than any view of distance bombing. We have still got headaches, and what nerves we had left are now gone. That was an event to talk about and feel brave over.

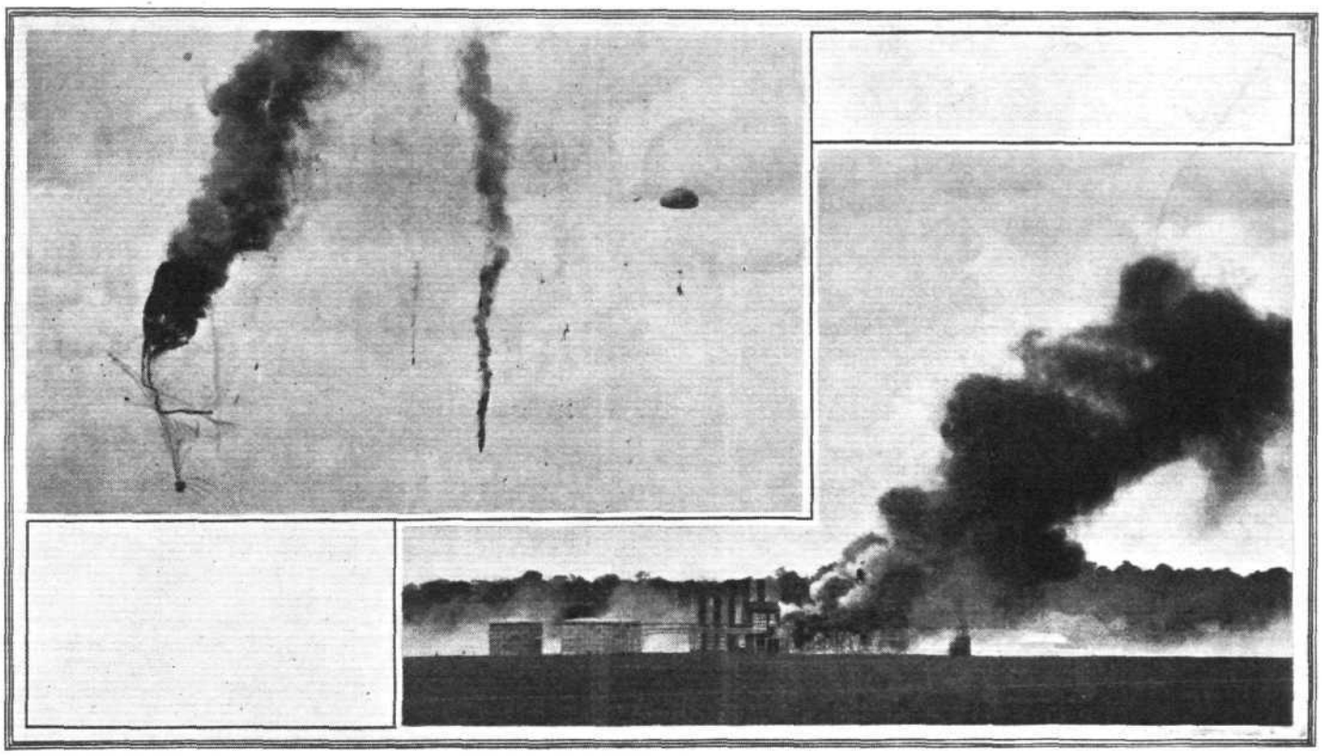
Aerobatics.—The exhibition of aerobatics on D.H. "Moths" by Flying Officers D. A. Boyle and R. L. R. Atcherly revealed expert piloting. For a greater part of their time they flew upside down, the white dots of the pilots' heads being visible against the black interior of the cockpits, and also banked steeply whilst still inverted. Flying wing-to-wing with one machine inverted and the other normal right across the aerodrome was another skilful feat, whilst their outside looping showed that that stunt was to them like any other. It would be hard to match their display on light aeroplanes.

Air Battle.—Handley Page "Hyderabads" and Hawker "Horsleys" approached to make a bombing raid, and were attacked by anti-aircraft guns, the "shots" peppering their tails as they steadily approached the aerodrome. Hawker "Woodcocks" came in to engage them, and one bomber went down in flames, whilst another was shot down by the anti-aircraft fire. The bomb raid was repeated in face of the opposition, there were casualties on both sides, and finally the surviving raiders receded in a great circle towards other points of vantage.



"FLIGHT" *Photographs*

BATTLING AT HENDON: (Top left) One of the bombers beginning its dive in flames after attack by fighters during a bombing raid. (Right) Another bomber meets the same fate. (Below) Armstrong-Whitworth "Siskins," belonging to the flight which won the Battle Flight Competition, taxi-ing along the enclosures after victory.



["FLIGHT" *Photographs*

AT HENDON : The final spectacular event. Observation balloon falling in flames, with Miss November—Major "Sandbag's" fiancée—descending by parachute. Below is the oil refinery blazing after premature ignition by the burning fabric from the balloon.

Attack on Oil Refinery.—This was the final event, and the most spectacular of the co-operative manœuvres. An oil refinery containing the enemy's supply of fuel was the objective of a British aircraft carrier, which despatched ships' fighters (Fairey "Flycatchers") to attack the adjoining anti-aircraft defences so as to disorganise them whilst the bombing machines arrived. An enemy observation balloon sighted them and gave warning, but it was attacked and shot down in flames, the observer, "Miss November," descending by parachute. The burning fabric unfortunately ignited the oil refinery when it fell to earth and, in a short time, before the bombers could get to work, only the skeleton framework remained; but the tanks themselves still required annihilating, and when the Fairey III.F reconnaissance machines arrived from the aircraft carrier they were partly blown up. D.H.9a's from a shore base then appeared, dropped their loads, and the whole destruction was thoroughly and neatly completed. The machines which carried out this event belonged to No. 405 (Fleet Fighter) Flight, No. 433 (Composite) Flight, No. 600 (City of London Bombing Squadron), and No. 601 (County of London Bombing Squadron).

Shortly after this their Majesties the King and Queen, the King of Spain and Duke of York left the aerodrome amidst loud cheering, and the huge crowd began its struggle for home.

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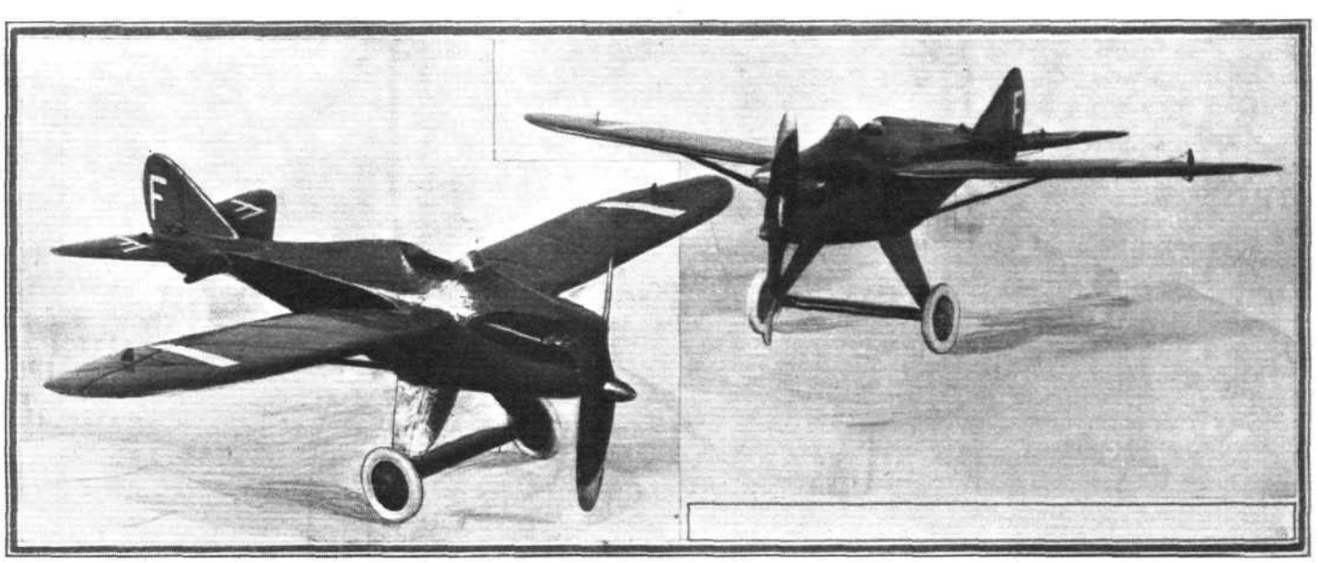

A MODEL RACER : Two views of a realistic model of a racing monoplane constructed of wood by a "Flight" Reader, Mr. Victor G. Manuel. It is about 14 ins. span, and while not of any particular make, French practice has evidently influenced its "designer." We understand Mr. Manuel is willing to undertake the construction of scale models of well-known types on similar lines, and we will be pleased to put any reader interested in the matter into touch with Mr. Manuel.

KING'S CUP AND SIDDELEY TROPHY TOUR

Supplementary Regulations II. The Course

The course is 1,096¼ miles, starting at Hendon Aerodrome and finishing at Brooklands Aerodrome.

Section 1.—Friday, July 20, 1928.

London (Hendon Aerodrome)	Start.
Controls :—	
Norwich (Mousehold Aerodrome)	99 miles.
Birmingham (Castle Bromwich)	132 ,,
Nottingham (Hucknall Aerodrome)	43½ ,,
Leeds (Sherburn-in-Elmet Aerodrome)	51¾ ,,
Newcastle-on-Tyne (Cramlington Aerodrome)	94 ,,
Glasgow (Renfrew Aerodrome)	121 ,,
Total, Section 1	540¾ ,,

Section 2.—Saturday, July 21, 1928.

Glasgow (Renfrew Aerodrome)	Start.
Turning Points :—	
SILLOTH. Solway Firth. White Cross on ground close to Lighthouse. Approaching Silloth from the north, competitors must pass the White Cross, leaving it on their *right* at a distance not exceeding 300 yards and at a height of not more than 5,000 ft.	79½ ,,
BLACKPOOL TOWER. Blackpool. Approaching Blackpool from the north, competitors must pass Blackpool Tower, leaving it on their *right* at a distance not exceeding 300 yards and at a height of not more than 1,000 ft.	74¼ ,,
Controls :—	
Liverpool (Hooton Park)	36 miles
Bristol (Filton Aerodrome)	124½ ,,
Southampton (Hamble Aerodrome)	71 ,,
Lympne (Lympne Aerodrome)	103½ ,,
Brooklands Aerodrome (Finish)	67¼ ,,
Total, Section 2	555½ ,,

Finish of the Race.—The finish of the Race is at Brooklands Aerodrome, and the finishing line is between Two White Arrows on the ground. The finishing line must be crossed in flight. The flight between the two arrows must be in the direction in which they are pointing.

Compulsory Stops at Controls.—Aircraft must make a stop of 30 mins. at each Control (instead of 20 mins.), with the exception of Glasgow (Renfrew Aerodrome), where they will remain the night.

Silloth and Blackpool are Turning Points only.

Weather Reports.—Arrangements are being made for Weather Reports to be available at all Controls.

Landing between Controls.—A competitor making a landing between Controls and retiring from the race is requested to advise by telephone the Control for which he was bound.

Verification of Aircraft.—On arrival at Hendon Aerodrome, on Thursday, July 19, each competitor must place his aircraft in the parking place allotted for it.

The competitor, or his representative, must remain with his aircraft until it has been examined and passed by the officials.

KING'S CUP RACE, JULY 20 AND 21, 1928

List of Entries

Racing No., Entrant, and Pilot (in brackets).	Aeroplane and Engine (in brackets).
(1) Will Hay (F. R. Matthews)	S.E. 5a (Airdisco).
(2) Lt. L. G. Richardson, R.N. (Lt. L. G. Richardson, R.N.)	D.H. Moth (Cirrus Mark II).
(3) Air Commodore J. G. Weir, C.M.G., C.B.E. (A. C. H. A. Rawson)	Autogiro C.8 L. 2 (Armstrong-Siddeley Lynx IV).
(4) Wing-Com. C. D. Breese, A.F.C. (Flt.-Lt. C. F. Le Poer Trench)	H.A.C. II (" Bristol " Cherub Mark III).
(5) Alan Samuel Butler (A. S. Butler)	D.H. Moth X (D.H. Gipsy).
(6) Sir Charles Wakefield, Bart. (Capt. H. S. Broad)	D.H. Moth G (D.H. Gipsy).
(7) W. Lawrence Hope (W. Lawrence Hope)	D.H. Moth G (D.H. Gipsy).
(8) Norman Jones (Norman Jones)	D.H. Moth X (Cirrus Mark II).
(9) Flt.-Lt. F. O. Soden, D.F.C. (Flt.-Lt. F. O. Soden)	D.H. Moth (Armstrong-Siddeley Genet I).
(10) J. Parkinson (J. C. Cantrill)	Avro Avian IIIa (Cirrus Mark II).
(11) A. C. M. Jackaman (A. C. M. Jackaman)	D.H. Moth X (Cirrus Mark II).
(12) Alan S. Butler (A. S. Butler)	D.H. Moth X (Cirrus Mark II).
(13) Harold Brooklyn (H. Brooklyn)	Westland Widgeon III (Armstrong-Siddeley Genet II).
(14) R. A. Bruce (Col. the Master of Sempill)	Westland Widgeon (Cirrus Mark II)
(15) Major A. A. Nathan (Wing-Com. S. W. Smith)	D.H. Moth X (Cirrus Mark II).
(16) R. A. Whitehead (R. A. Whitehead)	Baby Avro (Cirrus Mark I).
(17) P. N. G. Peters (Flt.-Lt. R. L. Ragg, A.F.C.)	Avro Avian (Cirrus Mark II).
(18) G. G. Parnall (Fl. O. D. W. Bonham Carter)	Parnall Imp (Armstrong Siddeley Genet II).
(19) T. O. M. Sopwith, C.B.E. (Flt.-Lt. P. W. S. Bulman, M.C., A.F.C.)	Hawker Heron (" Bristol " Jupiter VI).
(20) H. J. Thomas (Sq.-Lr. A. G. Jones-Williams)	" Bristol " 83 E (" Bristol " Titan Mark I).
(21) Sir George Stanley White, Bart. (C. F. Uwins)	" Bristol " 101 (" Bristol " Jupiter Mark VI A).
(22) H. J. V. Ashworth (Bernard Martin)	Avro Avian (Cirrus Mark II).
(23) D. Longden (Fl. O. R. L. R. Atcherley, R.A.F.)	Gloster Grebe (Armstrong-Siddeley " Jaguar ").
(24) G. F. Warwick (G. N. Warwick)	ANEC IV (Armstrong-Siddeley Genet).
(25) M. A. Lacayo (M. A. Lacayo)	D.H. Moth (Cirrus Mark I).
(26) Robert Blackburn (Sq.-Lr. J. Noakes, A.F.C., M.M.)	Blackburn Lincock (Armstrong-Siddeley Lynx IV).
(27) O. E. Simmonds (Flt.-Lt. S. N. Webster, A.F.C.)	Simmonds Spartan (Cirrus Mark II).
(28) R. L. Preston (Fl. O. L. S. Birt)	Blackburn " Bluebird " (Genet II)
(29) R. G. Cazalet (R. G. Cazalet)	Westland Widgeon III (Cirrus Mark II).
(30) H. M. Yeatman (H. M. Yeatman)	D.H. Moth (Cirrus Mark I).
(31) W. Newton (G. E. F. Boyes)	Avro Avian IIIa (Armstrong-Siddeley Genet II).
(32) A. V. Roe (Flt.-Lt. F. L. Luxmoore, D.F.C.)	Avro Avenger (Napier Lion Mark IX).
(33) A. V. Roe (Capt. E. W. Percival)	Avro Avian (Cirrus Mark II).
(34) A. V. Roe (H. A. Brown)	Avro Avian (Cirrus Mark II).
(35) Lieut.-Col. M. O. Darby, O.B.E. (Fl. O. T. Neville Stack, A.F.C.)	D.H. Moth X (Cirrus Mark II).
(35) Lieut.-Col. John Barrett-Lennard, C.B.E. (Sq.-Lr. H. W. G. Jones, M.C.)	A.D.C. Nimbus-Martinsyde (A.D.C. Nimbus).
(37) Miss W. E. Spooner (Miss W. E. Spooner)	D.H. Moth (Cirrus Mark I).
(38) Capt. C. B. Wilson, M.C. (E. E. Stammers)	D.H. Moth (Cirrus Mark I).

SIDDELEY TROPHY TOUR

July 20 and 21, 1928

Entrant-Pilot and Club, Machine and Engine (in brackets).

Lt. L. G. Richardson, R.N. (London Aeroplane Club), D.H. Moth (Cirrus Mark II).

Flt.-Lt. C. F. Le Poer Trench (Halton Aero Club), H.A.C. II (" Bristol " Cherub Mark III).

Norman Jones (London Aeroplane Club), D.H. Moth X (Cirrus Mark II).

Flt.-Lt. F. O. Soden, D.F.C. (London Aeroplane Club), D.H. Moth (Armstrong-Siddeley Genet I).

A. C. M. Jackaman (London Aeroplane Club), D.H. Moth X (Cirrus Mark II).

Harold Brooklyn (Halton Aero Club), Westland Widgeon III (Armstrong Siddeley Genet II).

R. A. Whitehead (Southern Aeroplane Club), Baby Avro (Cirrus Mark II).

Flt.-Lt. R. L. Ragg, A.F.C. (Royal Aircraft Establishment Aero Club), Avro " Avian " (Cirrus Mark II).

Flying Officer L. S. Birt (Suffolk and Eastern Counties Aeroplane Club), Blackburn " Bluebird " (Armstrong-Siddeley Genet II).

R. G. Cazalet (Midland Aero Club), Westland Widgeon III (Cirrus Mark II).

H. M. Yeatman (Hampshire Aeroplane Club), D.H. Moth (Cirrus Mark I).

Miss W. E. Spooner (London Aeroplane Club), D.H. Moth (Cirrus Mark I).

E. E. Stammers (London Aeroplane Club), D.H. Moth (Cirrus Mark I).

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At Buckingham Palace

AT the Investiture held by H.M. the King at Buckingham Palace on Wednesday, June 27, the following were severally introduced into the presence of the Sovereign, when the King invested them with the respective Divisions of the Orders into which they have been admitted :

Order of the Bath—Military Division

Knight Commander : Air Vice-Marshal Sir John Higgins.

Companion : Air Commodore Edgar Ludlow-Hewitt.

Order of the British Empire—Military Division

Commander : Group-Captain George Laing, R.A.F.

Officers : Miss Christine Cameron, Princess Mary's R.A.F. Nursing Service ; Sqdn.-Leader Alan Somerset-Leeke, R.A.F. ; the Rev. Maurice Edwards, R.A.F.

Members : Flight-Lieut. Hugh Nelson, R.A.F. ; Sergt.-Major Reginald Howes, R.A.F. ; Sergt.-Major Herbert Smith, R.A.F.

Distinguished Service Order

Companion : Sqdn.-Leader Francis Coleman, R.A.F.

His Majesty then conferred Decorations as follows :—

Air Force Cross

Flight-Lieut. Robert Barbour, R.A.F.

Flight-Lieut. David Greig, R.A.F.

Flight-Lieut. Leonard Maxton, R.A.F.

FLIGHT
AIRCRAFT ENGINEER & AIRSHIPS

AIRISMS FROM THE FOUR WINDS

Great Flying-Boat Cruise

THE four R.A.F. Supermarine-Napier Southampton flying-boats on the Australian cruise from England reached Melbourne, Australia, on June 29. The machines will be overhauled there and the cruise resumed towards Singapore in two months' time. About 16,500 miles have now been flown, and 70 ports called at.

Italian Polar Expedition

THE Air Ministry has agreed to lend two seaplanes to a private Norwegian expedition which is to search for Capt. Amundsen and Maj. Guilbaud, who have been missing since they left Tromsoe on June 18 in the Latham flying-boat. On July 2 Italian and Swedish machines again searched for the balloon of the lost airship, Italia, but were forced to return to Virgo Bay after a perilous flight in mist. The Russian ice-breaker, Krassin, is now within 80 miles of the red tent occupied by General Nobile's party. Lieut. Lundborg, the Swedish pilot, who rescued the General, and went back, only to make a forced landing, is still with the abandoned crew. It is thought that as the ice is breaking up and canals are being formed rescue will be effected by them rather than by planes, which will find a difficulty in landing on moving ice.

Round the World

MR. J. MEARS, who is attempting to travel round the world in 18 days, boarded the liner *Olympic* by seaplane on June 29, when the liner was five hours out from New York.

Capt. Courtney at Azores

AFTER one false start from Lisbon, Capt. Courtney reached the Azores from Lisbon, on June 28, in his Dornier-Wal flying boat (Napier engines). He left at 8 a.m., and the 900 miles was flown by the evening. Good weather is now awaited before the next stage to Newfoundland is attempted. Marconi transmitting and receiving apparatus is carried, operated by a qualified Marconi operator.

Long-Distance Flying

A SOVIET military aeroplane, which left Moscow recently, flew the 796 miles to Sebastopol in 6 hrs. 5 mins. without a stop.

Rome-Buenos Aires Non-Stop

CAPT. ARTURO FERRARIN and Major Carlo del Prete, the Italian airmen, left Rome on July 3 in an attempt to fly to Buenos Aires, a distance of 7,000 miles, non-stop. They expect to be in the air between 55 and 60 hrs. Major del Prete accompanied the Marquis de Pinedo on the latter's world flight last year, and with Ferrarin he recently made a world's record for duration flight.

Greek Air Tour

A GREEK military aeroplane, Breguet 19, flown by Col. Adamides and Capt. Papadakos, reached Athens from Bucharest on July 1, after an air tour of 10,000 miles round the Mediterranean at an average speed of 100 m.p.h. They left Athens three weeks ago, and stopped at Aleppo, Alexandria, Cairo, Tripoli, Casablanca, Paris, and Bucharest. The trip between Paris and Bucharest was accomplished in record time. Their flight, by terminating successfully, is considered promising for the young Greek Air Service.

Aerial Influence—Superstition

A CURIOUS incident is reported from British Nigeria, where certain natives refused to pay taxes. An aeroplane appeared one day and alighted on the spot. The native chief then paid the taxes because he thought it was impossible to quarrel with a Government that "sent men through the skies."

Belgian Tour

THE Belgian airmen, MM. Thieffry and Quersin, who are flying to the Congo, were forced to land in Gard, France, in marshy district, after a 300 miles' flight from Mourmelon (Marne) recently. Engine failure was the cause. They were unhurt.

German Record Attempt

Two Junkers pilots, Herren Ristics and Zimmerman, left Dessau aerodrome on July 2 in a single-engined Junkers monoplane to attempt a duration record.

Miss Earhart's Light Plane

THE Avro "Avian" (Cirrus) owned by Lady Heath, in which she flew from Cape Town to London recently, has been purchased by Miss Earhart, the first woman to fly the Atlantic, and taken to America.

American Air Lines

AN air passenger service to Toledo, Ohio, on the Chicago-New York air mail line became effective June 11, when National Air Transport changed their intermediate stop from Bryan, Ohio, to Toledo. Passenger fare from Chicago to Toledo will be $70·00 and from Cleveland to Toledo $30·00. While the service is of an emergency nature, passengers being required to travel in the regular mail and express planes, National Air Transport will soon have a regular daily passenger service in operation between Chicago, Toledo, Detroit, Cleveland, and New York over its present air mail route, using multi-motored 14-passenger craft. Passenger fares, it is expected, will be much lower than those charged now for the emergency service. Only day services are run at the moment. The flight from Chicago to Toledo takes 2 hrs. and 5 mins.

FOR THE ATLANTIC FLIGHT: The Dornier-Napier all-metal flying-boat, fitted with two 450 h.p. Napier "Lion" engines, in which Capt. F. T. Courtney is attempting a return flight across the Atlantic. It is equipped with Marconi wireless.

A FOKKER-"JAGUAR" COMBINATION: The Fokker C.VI Observation biplane, fitted with an Armstrong-Siddeley "Jaguar" supercharged engine. This machine is a development of the Fokker C.V.D., previously described in "FLIGHT."

Australia Buying Aeroplanes

AUSTRALIA intends to purchase 32 modern aircraft in pursuit of its defence scheme, at a total cost of £150,000. The types will include fighters, light bombers, and co-operation machines. A contract has also been accepted for a civil air service between Adelaide and Perth for mails and passengers, for which four De Havilland "Hercules" three-engined commercial machines are to be ordered, costing £15,000 each. The service will operate day and night, and the distance will be flown in 24 hrs. The decision to make this move follows quickly upon the arrival of Air Vice-Marshal Sir John Salmond, who is visiting Australia at the request of the Government to advise on the Commonwealth air defences.

Gordon Bennett Balloon Race

AT Detroit on June 30 the Gordon Bennett Balloon Race was started by Mr. Edsel Ford. Eight countries were represented by the competitors. The balloons and crews in the race were:—

1, Munster (Germany), pilot, Ferdinand Eimenacher, aide, Carl Zeck; 2, American Business Club (United States), A. Chalmers and Lieut. F. M. McKee; 3, Detroit (United States), W. C. Naylor and Rund Wherritt; 4, Lafayette (France), Georges Blanchet and Alphonse Coquois; 5, Barmen (Germany), Hugo Kaulen and Hugo Kaulen, jun.; 6, Brandenburg (Germany), Otto Bertram and Georg Frodnel; 7, Denmark (Denmark), Sau Rasmussen and Tracy Southworth; 8, Helvetia (Switzerland), E. Maag, flying alone; 9, United States Army (United States), Capt. W. E. Kepner and Lieut. W. O. Earecson; 10, Argentina (Argentina), Eduardo Bradley and Huberto H. Elliff; 11, Wallonie (Belgium), Joseph Thonnard and Prof. Maurice Boel; 12, Blanchard (France), Charles Dollfas and Georges Carmier.

All the balloons have a gas capacity of 80,000 cub. ft., except the Helvetia, whose capacity is 35,000 cub. ft. Maag's racing balloon was damaged in transit, and the smaller Helvetia was the only balloon available for him.

Twenty Years Ago!

Extract from "The Auto" (Precursor of "Flight"), July 4, 1908.

"The Republic's Airship.—On Wednesday of last week, the first trip of the magnificent new military airship, constructed by MM. Lebaudy Frères for the French Government, was duly launched successfully and made its maiden trip for testing purposes. . . . That the Lebaudy Bros. have now brought the construction of this type of machine to a fine art there can be little doubt, as without the smallest hitch the huge vessel took the air and answered with precision every requirement of those in charge."

THE STOCKHOLM-LONDON NIGHT AIR MAIL: As reported in a previous issue of "Flight," the Swedish Aerotransport Co. inaugurated a night air mail service between Stockholm and London, on June 18. Our illustration shows the Junkers F.13 machine which made the first trip, piloted by Liljeberg; it left Stockholm at 4 p.m., June 18, and arrived at Croydon at 14.45 p.m., June 19 (having been delayed two hours at Amsterdam owing to a broken speed indicator). On this flight 500 registered and 3,000 ordinary letters were carried.

FLIGHT

PRIVATE  FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

BLACKPOOL AIR PAGEANT

ON July 6 and 7, the Blackpool Air Pageant will be held, and it is likely to be one of the biggest events of its kind. The flying ground is at Squires Gate, where, nineteen years ago, the first flying meeting in this country took place.

The Air Ministry is sending 350 officers and men from the Defence Forces, and it is understood that their programme is likely to follow on "Hendon" lines. There will be a big air battle in which three separate squadrons will engage, and enemy forts will suffer destruction. Low bombing and the speedy despatch of a battle squadron on receiving an alarm are other Air Force features to be looked forward to.

It is anticipated that 200 pilots will represent civil aviation, embracing club flying and private flying, for all the clubs are almost inevitably bound to be there as the occasion is regarded as an official inter-club meeting. Thirty-seven separate events, excluding various displays, are scheduled for their participation, covering races, fancy flying, parachuting, sky writing, and the usual manœuvres.

The first international permit comes into operation for the meeting, which allows for the appearance of many foreign noted pilots, such as the German war "ace," Herr Fieseler, who will come from Germany and perform his extraordinary stunts, which he ably described in FLIGHT, January 5, 1928. Also Marcel Doret, a well-known French stunt pilot, will entertain.

An interesting item should be the fly-past of many prominent pilots, such as Sir Alan Cobham, Capt. H. Broad, Capt. N. Stack, Lady Heath, Flt.-Lt. S. N. Webster, Mr. Howard Pixton, Mr. A. V. Roe, Sqdn. Ldr. T. England, Herr Fieseler, Marcel Doret, etc. Amongst lady pilots, there will also be in all probability, Miss S. O'Brien, Miss W. S. Brown, Miss C. Lethart, and Miss W. Spooner, all private owners and qualified pilots.

Flt.-Lt. Webster is to fly the fast Avro "Avenger," which so impressed everyone at the Hamble meeting this year; Flt.-Lt. Bulman, the Hawker Aviation Company test pilot, will fly the Hawker "Heron" (500 h.p. Bristol "Jupiter"), Mr. Dudley Watt, of Brooklands, the racing pilot of past prominence, is to be there on a machine of his own design, DWI. The crazy flying expert, Sqdn. Ldr. Noakes, will play his usual attractive part and also engage in three separate events. Mr. K. Twemlow, of T.T. fame, is expected to fly for the Lancashire Aero Club in the Inter-Club race.

Competitive events consist of four open events, namely, Open Handicap, Blackpool Nomination Handicap, Daily Despatch Nomination Handicap, and Balloon Bursting Competition. There is one Owner Pilots' Race; three Inter-Club events, an Inter-Club Members' Race, and Inter-Club relay Race and Instructors' Aerobatic Contest.

On the first day, Friday, July 6, the programme will commence at 10.30 a.m., and in addition to the competitive events, there will be special exhibitions by Sqdn. Ldr. Noakes, Capts. Stack, Broad and Brown on light aeroplanes; a display by Flt.-Lt. Luxmoore on the Avro "Avenger," up-side down aerobatics by Herr Fieseler and a parachute drop by Miss June. On Saturday, July 7, the programme starts at 10 a.m., and Mr. G. E. Lowdell will do up-side down flying; Sqdn. Ldrs. England and Noakes perform on the slotted wing machines; a parachute drop by Mr. Irving and the R.A.F. Display.

Imperial Airways are sending two of their air liners for joy-riding purposes, in which capacity the usual number of Avros will also serve. Two old friends, the Beardmore "Wee Bee" monoplane and the Austin "Whippet," are likely to be flying.

The ground has accommodation for 190,000 people, besides car parks for 8,000 cars. In the one-shilling enclosures there is room for 145,000 people. Other prices of admission are:—Special enclosure in the grand stand, £1 1*s.*; ordinary grand stand, 6*s.*; stand enclosure, 3*s.*; There is no seating provided for the shilling enclosure. Advance tickets, including reserve spaces in the car parks, may be obtained from the Town Clerk, Town Hall, Blackpool, at reduced prices, and from the usual ticket agencies.

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W. 1.

Bristol and Wessex Aeroplane Club, Filton, Gloucester. Secretary, Capt. C. F. G. Crawford, Filton Aerodrome, Patchway.

Hampshire Aero Club, Hamble, Southampton. Secretary, H. J. Harrington, Hamble, Southampton.

Lancashire Aero Club, Woodford, Lancs. Secretary, C. J. Wood, Oakfield, Dukinfield, near Manchester.

Midland Aero Club, Castle Bromwich, Birmingham. Secretary, Maj. Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

Newcastle-on-Tyne Aero Club, Cramlington, Northumberland. Secretary, A. H. Bell, c/o The Club.

Norfolk and Norwich Aero Club, Mousehold, Norwich. Manager, F. Gough, The Aerodrome, Mousehold, Norwich.

Nottingham Aero Club, Hucknall, Nottingham. Hon. Secretary, Cecil R. Sands, A.C.A., Imperial Buildings, Victoria Street, Nottingham.

The Scottish Flying Club, 101, St. Vincent Street, Glasgow. Secretary, Harry W. Smith.

Southern Aero Club, Shoreham, Sussex. Secretary, C. A. Boucher, Shoreham Aerodrome, Sussex.

Suffolk Aeroplane Club, Ipswich. Secretary, Maj. P. L. Holmes, The Aerodrome, Hadleigh, Suffolk.

Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Secretary, Lieut.-Col. Walker, The Aerodrome, Sherburn-in-Elmet.

LONDON AEROPLANE CLUB

REPORT for week ending July 1.—Flying time, 11 hrs. 45 mins.; dual instruction, 5 hrs. 40 mins.; solo flying, 6 hrs. 5 mins.

Solo Flying:—O. J. Tapper, Art. Fowler, J. R. A. Stroyan, J. A. Brewster, E. R. Andrews, P. W. Hoare, C. E. Murrell, G. W. Hall, J. C. V. K. Watson, F. C. Fisher, R. Sanders Clark, Miss Wilson, A. J. Millar.

Dual Instruction:—J. R. A. Stroyan, P. W. Hoare, R. L. Portway, E. H. Thierry, C. W. Bonniksen, Miss H. Cholmondeley, Miss V. M. Cholmondeley, Miss Wilson, G. E. Clair, A. J. Millar.

Owing to the Royal Air Force Display all Club flying was suspended on Thursday, Friday, Saturday and Sunday.

Blackpool Meeting.—The Club will be represented in the various races at the Blackpool Meeting on July 6 and 7 by Maj. K. M. Beaumont, D.S.O., G. H. Craig, J. J. Hofer and Mr. Will Hay.

BRISTOL & WESSEX AEROPLANE CLUB, LTD.

REPORT for week ending June 30. Total flying time, 11 hrs. 45 mins.; dual instruction, 4 hrs. 10 mins.; solo, 6 hrs.; passengers, three flights, 20 mins.; cross-country, three flights, 4 hrs. 35 mins.

Under Instruction with Mr. Bartlett:—Messrs. Amory, Allinson, Keeling, Peters, Singh, Pollock, T. H. Clarke.

Solo Flying:—Messrs. Downes-Shaw, Hall, Jopp and T. H. Clarke.

Mr. Downes-Shaw returned from his cross-country flight to Ramsgate on Sunday afternoon. He called at Lympne and Hamble on his way, and after landing at Filton, paid a visit to Flax Bourton in the evening.

Mr. Downes-Shaw with Mr. T. H. Clarke as passenger, and Mr. Bartlett with Mr. R. S. W. Clarke as passenger, left for Stag Lane on Saturday to see the R.A.F. Display at Hendon. Mr. Downes-Shaw returned the same evening.

CINQUE PORTS FLYING CLUB

REPORT of week ending June 30.—Machine G-E.B.W.C.; total time, 10 hrs. 15 mins.; test flight, 20 mins.

Joy rides (with Maj. Clarke):—Messrs. Haywood, Bailey, Baily, Avery, Flower, Batchelor, Epse, Lusty, Gunner, Capt. A. G. Ellery, Miss Collman, Miss S. Old, Miss Bailey. (10 mins. each.)

Dual Instruction (with Maj. Clarke):—Mr. Sherwood Glynn, 3 hrs. 15 mins.; Mr. West, 15 mins.; Mr. Douglas, 1 hr.; Miss Allen, 1 hr.; Miss Tagart, 30 mins.

Soloists:—Mr. R. Dallas Brett, 15 mins.; Mr. West, 45 mins.; Mr. Douglas, 15 mins.

Consequent upon our tip-up last week, it was decided to give the engine a complete overhaul, and the machine was not ready for flying until Wednesday,

June 27, consequently this report covers only four days' flying, which accounts for the low "hourage" flown.

On Wednessday, June 27, the members of the Ashford, Kent, Rotary Club visited the aerodrome. Several of them took joy rides in the Moth, and apparently greatly enjoyed themselves. We trust that they will inform their friends that aviating is not the hazardous pastime it is so often made out to be.

On Thursday, two members were ready for their "A" licence tests, but unfortunately the high winds which prevailed all the week rendered this impracticable. We have now, four members waiting to take their tests, and Commander S. E. Deacon, R.N. (retired) has been appointed Official Observer to the club for the Royal Aero Club examination.

Mr. Edgson Wright has organised a novel entertainment at Ashford Golf Links. He will play golf from our Moth against two members of the golf club who willl play normally on the ground. His "drop shot" will count as the approach shots allowed Col. Bogey for the hole, and he will be assisted by a partner on the ground armed with niblick and putter, who will hole out. Play commences 2 p.m., Wednesday, July 4. Admission 6*d*.

MIDLAND AERO CLUB LIMITED

REPORT for week ending June 9.—Total flying time, 28 hrs. 3 mins.

Members given Dual Instruction (by Flt.-Lt. T. Rose, D.F.C., and Mr. W. H. Sutcliffe) :—O. L. Richards, J. Cobb, E. P. Lane, G. C. Jones, R. C. Baxter, J. Rowley, H. Coleman, S. Nesbit, M. A. Murtagh, G. P. Haylock, A. E. Coltman, H. Tipper, G. E. C. Hill, N. Khatri, M. Turner, S. Duckitt.

Solo :—R. D. Bednell, S. G. Hall, E. P. Lane, W. Swann, R. L. Jackson, W. M. Morris, E. J. Brighton, S. H. Smith, E. R. King, R. C. Baxter, G. Robson.

Passenger flights were given to 16 members.

On Sunday, Mr. R. C. Baxter was launched solo.

REPORT for week ending June 16.—Total flying time, 30 hrs. 43 min. Dual 13 hrs. 28 mins. Solo, 11 hrs. Passenger, 5 hrs. 15 mins. Test, 1.

Dual Instruction (with Flt.-Lt. T. Rose, D.F.C., and Mr. W. H. Sutcliffe) :—G. C. Jones, E. D. Wynn, R. C. Baxter, J. Cobb, S. G. Hall, J. B. Briggs, M. Turner, R. Summerfield, S. Duckitt, T. H. Drury, K. W. Symington, H. Coleman, S. Nesbit, G. E. C. Hill, M. A. Murtagh, Capt. J. C. Chaytor, Capt. H. G. Tower.

Solo :—E. D. Wynn, W. M. Morris, G. Brinton, S. Duckitt, E. J. Brighton, R. D. Bednell, G. Robson, S. Nesbit, R. C. Baxter, H. Tipper, C. W. Fellowes, S. G. Hall, R. L. Jackson, S. H. Smith, W. Swann.

Passengers :—Miss M. Brinton, E. W. Banwell, B. Cheston, J. E. Gold, C. Eckersley, A. Methley, G. Sproston, E. D. Wynn, F. E. B. Hall.

During the week, Messrs. S. Duckitt and S. Nesbit were launched solo.

Report for week ending June 23.—Total flying time, 47 hrs. 44 mins. Dual, 23 hrs. 45 mins. Solo, 11 hrs. 33 mins. Passenger, 10 hrs. 40 mins. Tests, 1 hr. 46 mins.

Following members were given Dual Instruction (by Flt.-Lt. Rose, D.F.C., and Mr. W. H. Sutcliffe) :—J. Cobb, A. E. Coltman, O. L. Richards, G. P. Haylock, J. B. Briggs, H. Coleman, M. A. Murtagh, C. G. Jones, H. J. Willis, R. Summerfield, F. J. Steward, K. W. Symington, S. Duckitt, R. C. Baxter, G. E. C. Hill, M. Turner, G. Savage, H. Beamish, Major D. Thomson, Capt. H. G. Tower.

Solo : E. P. Lane, R. D. Bednell, R. L. Jackson, E. D. Wynn, C. W. Fellowes, S. G. Hall, E. J. Brighton, H. J. Willis, S. H. Smith, S. Duckitt, R. C. Baxter, G. Robson, J. Rowley, S. Nesbit, H. Tipper, G. E. C. Hill, W. M. Morris, W. Swann, G. Savage.

Passengers :—J. Haylock, N. R. Greathead, E. Crellin, D. W. Brinton, A. Harley, Mrs. Harley, Miss Harley, C. Eckersley, A. Methley, H. Moore, G. E. Griffin, Dr. Johnson, S. Nesbit, J. Gibbons, B. Cheston, M. Turner, R. Ford, Miss N. Ford, O. W. Banwell.

On Sunday, Messrs. E. P. Lane and S. G. Hall passed all tests for their "A" Licences, and on Thursday, Mr. G. E. C. Hill successfully made his first solo.

The Club created a new record for total hours flown this week, exceeding the previous record by 7 hrs.

NEWCASTLE-UPON-TYNE AERO CLUB

REPORT for week ending July 1.—Total flying time, 14 hrs. 15 mins. Instruction, 6 hrs. 30 mins. "A" Pilots, 5 hrs. 10 mins. Passengers, 1 hr. 45 mins. Tests, 50 mins.

Instruction (with Mr. J. D. Parkinson) : Miss Slade, Miss Trevelyan, Messrs. Kendrick, Lawson, Twine, Dodds.

"A" Pilots.—Mrs. Heslop, Messrs. C. Thompson, N. S. Todd, W. L. Runciman, D. Wilson, J. D. Irving, R. N. Thompson.

Little flying has been possible this week on account of high winds, which show no signs of abating, but we are hoping the weather will improve to enable our three Moths to proceed to Blackpool this week.

Mr. and Mrs. Butler, on a Moth "UX," Mr. Lines on an Avian "WU," and Mr. Hope on a Moth, called at the aerodrome during the week.

NORFOLK & NORWICH AERO CLUB

REPORT for week ending June 24.—Total flying time, 15 hrs. 20 mins.

Instruction with Mr. Young : Messrs. C. C. White, A. G. Woods, H. Cator, G. Wharton, H. P. Clarke, C. Ransome, A. G. Lofty, C. Corsellis, T. Image, W. A. Palmer, F. Rinder.

Soloists : Messrs. R. Potter, R. Harmer, N. Brett, A. Cooper, F. Gough, H. P. Clarke, A. G. Lofty, E. Varden Smith, G. F. Surtees, G. Barker, W.P. Cubitt, R. Moore. Passengers, 22.

We are happy to record the first solo of Capt. H. Piers Clarke, who after just 4 hours' training, put up a splendid show.

Honouring Our Foreign Guests

A PRIVATE luncheon was given on July 2 by the Air Council at the Savoy Hotel to the air officers from France, Italy, Belgium, Denmark, Sweden and Norway who are at present visiting this country. Sir Samuel Hoare, Secretary of State for Air, presided. The guests included : France, Generals Hergault, Pujo, De Segame, Admiral Frochot ; Italy, Generals Balbo, Verdezio, Lombard and Col. Teteschini-Lalli ; two officers from Belgium, two from Denmark, three from Sweden, and one from Norway.

Supporting Sir Samuel Hoare were Sir Philip Sassoon, Under Secretary of State for Air, Marshal Royal Air Force Sir Hugh Trenchard, and other members of the Air Council, senior officers of the Royal Air Force and Air Ministry.

High winds have been blowing here this week, and not much flying has been done until evenings ; therefore we are decidedly low with flying time. With only one machine running, however, it is not too bad.

The "Moth" is flying to Hendon on Saturday piloted by Messrs. R. W. Moore and N. A. Brett, both "A" licence experts, and if they bring it back whole Messrs. F. Bough and G. F. Surtees are tripping off to Blackpool on the following Thursday in readiness for the pageant.

REPORT for week ending July 1.—Total time flown, 8 hrs. 45 mins.

Instruction with Mr. Young.—Messrs. C. Ransome, G. Wharton, A. G. Woods.

Soloists.—Messrs. H. P. Clarke, S. Birt, E. Lambert, R. Harmer, W. P. Cubitt, N. Breet, R. Moore, R. Potter, F. Gough. Passengers, 7.

This has been a "dud" week for flying here, and on Friday it was the most impossible day. Our two Hendon aspirants kicked their heels round the aerodrome until 9 o'clock in the evening before the wind dropped, and most of the rain had also. They arrived at Duxford Aerodrome, where we believe they spent the night. After that we have not much trace of their movements ; perhaps it is just as well.

New members continue to enrol, and are enthusiastically taking up instruction ; we expect to send another batch of "A's" off in the next week or so.

NOTTINGHAM AERO CLUB

REPORT for week ending June 29.—Total flying time, 22 hrs. 55 mins. Dual, 7 hrs. 45 mins. Solo "A," 7 hrs. 10 mins. Solo (under instruction), 5 hrs. 55 mins. Passenger flights, 50 mins. Tests, 1 hr. 15 mins.

Dual (with Mr. Martin) :—Miss Bostock and Messrs. Taylor, Chawla, F. Hatton, Shipside, Thirlby, Hancock, Glenn, Lucas, and Bradley.

"A" Pilots.—Messrs. Paul, Whitby, Blake, Hallam, Cox, Hamilton, and F. Granger.

Soloists (under instruction) : Messrs. Bradley, Hancock, Selvey, Pilgrim and Glenn.

Passengers (with Mr. Martin :—Miss Granger, Miss L. and Miss M. Smith, Miss Woodward, and Mr. J. Granger ; (with Mr. Hallam) : Mrs. Cullen, Miss Jefferson, and Messrs. Webb, Knowles, and Clay ; (with Mr. Blake) : Messrs. Culley and Dickson ; (with Mr. Cox) : Mr. Gascoigne ; (with Mr. Hamilton) : Messrs. Lucas, Molesworth, and Heath ; (with Mr. Paul) : Mr. Taylor ; (with Mr. Whitby) : Mr. Norman.

Congratulation to Mr. Kenneth Hancock on his first solo effort this week.

YORKSHIRE AEROPLANE CLUB

REPORT for week ending June 30.—Flying time, 26 hrs. 10 mins. Dual, 11 hrs. 35 mins. Solo, 13 hrs. 25 mins. Passengers, 1 hr. 10 mins.

Instruction (with Capt. Beck) : Messrs. Ambler, Arundel, Bell, Blackburn J., Brown, Dujardin, Miss Ellison, Messrs. Lievans, Parks, Senior, Upton, Williamson, Wilson, Wilton.

Instruction (with Mr. Stockbridge) :—Messrs. Dujardin, Ostler, Parks.

Soloists.—Messrs. Brown, Dick, Reynolds.

"A" Pilots.—Messrs. Ambler, Clayton, A. Crowther, H. Crowther, Ellison, Humpheries, Lax, Norway, Thomson, Wood, Wilson.

Passengers, 4.

On Sunday last, Mr. and Mrs. Buscarlet paid us a visit on their way back from Sedbergh, also Mr. Jackaman. On Monday, Capt. Beck did a tour of the East Riding coast, and on Thursday he flew to Oxford with Mr. Wilson to enable the latter to effect a speedy collection of a Morris car from the Cowley Works, and thence to London for a Medical Board.

The chests of all our members at the Pageant filled with pride in that we could boast of "Batchy" as a member of the Yorkshire Club.

FROM THE FLYING SCHOOLS

The De Havilland Flying School, Stag Lane Aerodrome

REPORT for week ending July 1.—Total flying time, 63 hrs. 30 mins. Instruction, dual, 27 hrs. 45 mins. Solo, 10 hrs. 15 mins. Other flying, 25 hrs. 30 mins.

Our flying has been greatly curtailed this week, owing to the Royal Air Force practising in the vicinity of Stag Lane for the Air Pageant.

Major de Bernardi, the famous Italian racing pilot, flew a "slotted Moth," and was delighted with the experience of such an "armchair flight."

Two officers of the Danish Air Force also visited us and flew Moths to their great satisfaction. Seven new Moths were tested, including the second "Gipsy."

Henderson Flying School, Brooklands Aerodrome.

REPORT for week ending June 28.—Total flying time, 37 hrs. 50 mins.

Dual (with Lt.-Col. G. L. P. Henderson) :—Messrs. Bennett, Brooks, Dr. Forsyth ; (with Capt. H. D. Davis) : Miss Wellby, Messrs. Bellamy, Hill, Taylor, Oldmeadow, Groner, Bennett, Norbury, Matos, Major Parkin ; (with Capt. W. F. Davenport) : Miss Wellby, Messrs. Matos, Saunders, Buckle, Swan.

Solo.—Messrs. Crabtree, Bellamy, Oliver, Anderson, Grierson, Dr. Wall, Brooks, Carlos.

Mr. Bellamy has passed for his R.A.C. Licence, and Mr. Crabtree has completed the cross-country test for his "B" Licence.

Our two new lady pupils show great promise, and seem to get hold of the elementary flying with great ease.

High winds have interfered considerably with the school work during the week.

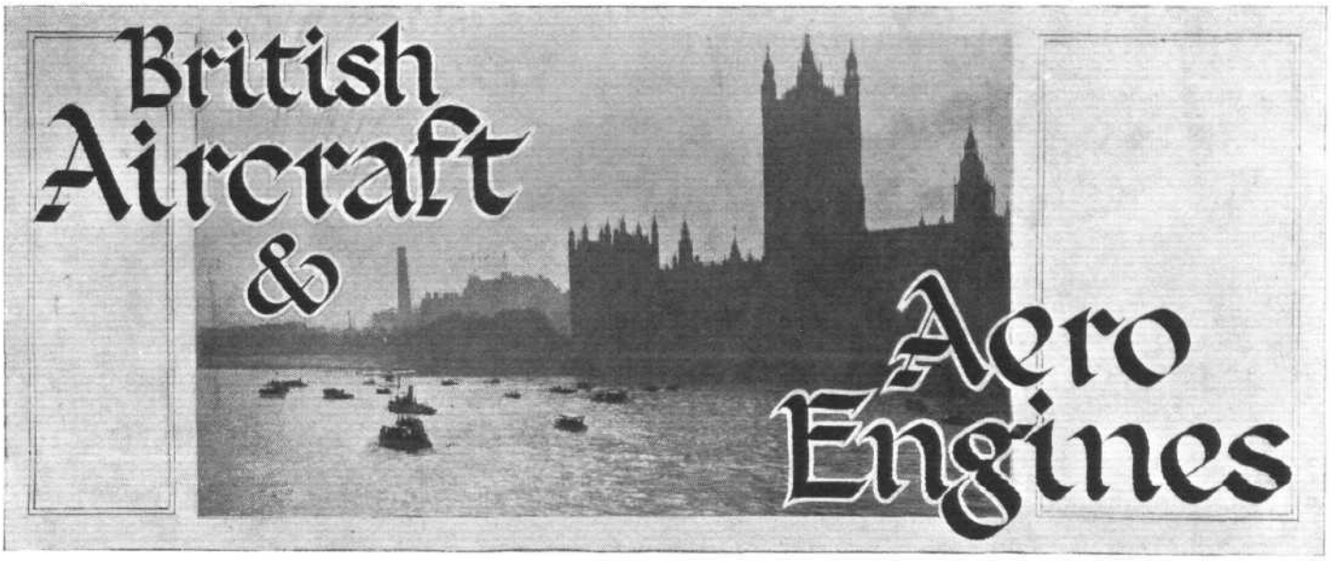
430 passengers were carried on our machines during the week.

Air Developments in Scotland

CONCERNING mail and passenger services to the Western Isles of Scotland, it is stated that the Aerial Taxis (Scotland) Co. have submitted to the Government a tender for the contract. It is intended to organise a service of either sea-planes or aeroplanes between the Western Islands and the Highlands. A restricted passenger service would also be run.

Saved by Parachute

MAJOR CUTRY FRANCESCO was saved by a Salvator parachute on June 18, when his machine caught fire at Centocelle, Rome. The pilot, Sergt.-Major Garavaglia Carlo, delayed his jump, and although the parachute started to function, he was killed. General Nobile carried the same type of parachute on his recent Arctic expedition.



IN the following pages will be found illustrations and brief specifications of a number of British aircraft and aero engines. Owing to restrictions imposed by the British Air Ministry, it is not, it should be pointed out, permissible to publish performance figures of the very latest types, and thus in most instances types are in existence which have a considerably better performance than those given. On the other hand, the performance figures published may be accepted as being accurate and not merely got out for "show purposes." In very many cases they are the figures actually attained during officially supervised tests.

Although it is fairly common abroad to publish such aircraft specifications, it has not usually been the custom in Great Britain, and we feel that in giving them this week, we shall be placing in the hands of our readers a collection of data which will be of very considerable interest and value.

One very notable feature of the specifications published in the following pages is that quite a large percentage relate to machines of the flying-boat type, which fact is an indication of the rapid progress Great Britain has made in this particular field, and in which she now unquestionably leads the world. In structural strength, aerodynamic efficiency and sea and air worthiness British flying-boats are second to none in the world.

A study of the specifications given will also show that in the matter of ratio of load carried to total loaded weight, the British flying-boats are very efficient, and not far behind, if at all, machines of the landplane type.

Following is a list of the machines and engines of which specifications are given, the numbers indicating the page on which each specification is to be found, the numbers in italics being the Supplement page :—

["FLIGHT" *Photograph*

A.D.C. "NIMBUS-MARTINSYDE"

One A.D.C. "Nimbus" Engine

GENERAL

ORIGINALLY designed by the now defunct Martin and Handasyde Company, the "Nimbus-Martinsyde" is a modification by A. D. C. Aircraft, Ltd., who hold stocks of a number of Martinsyde F.4 biplanes and who, moreover, have purchased the goodwill of the Martinsyde company. The "Nimbus-Martinsyde" remains an F.4 in almost all respects, except that the nose has been re-designed to take the A.D.C. "Nimbus" engine produced a few years ago. The Martinsyde biplanes were ever known for their excellent qualities, aerodynamic and structural, and the present machine has maintained that reputation. As a single-seater fighter, it is a very useful machine, and for service in countries where it is not essential that all-metal construction should be used, this machine offers a low-priced low-powered supply with good performance for the small power used.

Fuselage.—Of wood construction, simple and cheap to maintain and repair, the fuselage is of good streamline shape as evidenced by the performance of the machine. The top centre-section is placed low over the cockpit, so that the pilot obtains a good view past the top plane. The two Vickers guns are placed one on each side, and provided with the usual interrupter gear. The aircraft controls are of normal type, and the machine is very manœuvrable and light on the controls.

Wings.—Of standard two-spar construction, with spruce spars spindled out to an I-section, and light wooden ribs, the whole covered with fabric. The top centre-section is supported on a *cabane* of four wire-braced wooden struts, while the two halves of the lower wing are attached direct to the fuselage.

Tail.—Of wood construction, fabric covered. The tail surfaces are of generous area, and the controls are very effective. The tail plane is braced downwards by one strut and one wire on each side, and on top by wires to the fin post.

Engine Installation.—The 300/330 h.p. A.D.C. "Nimbus" engine is extremely neatly cowled-in and faired into the lines of the fuselage, thereby contributing materially to the low drag of the machine. The radiator is mounted behind and below the engine.

Undercarriage.—Of simple two-wheeled Vee type, with axle running across and springing provided by easily-renewable rubber cords.

Power Plant

Engine	A.D.C. "Nimbus."
Total horse-power	330 b.h.p.
Propeller drive	Direct.
Fuel capacity	321 lb. (146 kg.).
Placing of fuel tanks	In fuselage.
Fuel supply	By pump.

Main Dimensions

Wing span	32 ft. 9 in. (9·98 m.).
Length o.a.	26 ft. 10 in. (8·18 m.).
Height	9 ft. 6 in. (2·9 m.).

Weights and Loading

Weight empty	2,014 lb. (913·5 kg.).
Fuel and oil	321 lb. (146 kg.).
Military load—	
Two Vickers' guns	66 lb. (30 kg.).
1,200 rounds of ammunition	94 lb. (42·6 kg.).
Crew	170 lb. (77 kg.).
Total loaded weight	2,665 lb. (1,208·8 kg.).

Performance

Maximum speed	150 m.p.h. (241 km./h.).
Cruising speed	131 m.p.h. (211 km./h.).
Landing speed	50 m.p.h. (80 km./h.).
Climb to 10,000 ft. (3,050 m.)	7·5 mins.
Climb to 15,000 ft. (4,570 m.)	14 mins.
Climb to 20,000 ft. (6,100 m.)	25 mins.
Service ceiling	23,500 ft. (7,163 m.).
Endurance at cruising speed	2½ hrs.
Range at cruising speed (still air)	327 miles (527 km.).

FLIGHT

THE ARMSTRONG WHITWORTH "ATLAS"

One Armstrong-Siddeley "Jaguar" Engine

GENERAL

THE "Atlas," designed by Sir W. G. Armstrong Whitworth Aircraft, Ltd., of Whitley, Coventry, is a two-seater general purpose aeroplane. It is fitted with a "Jaguar" engine, which may be of various types according to the purpose for which the aircraft is intended. It is the standard Army co-operation aeroplane for the British Air Service, for which purpose it carries two machine guns, wireless, camera, message-picking-up gear, and small bombs. It can also be arranged as a light bombing aeroplane, for which purpose the total load carried is increased and extra petrol tanks can be fitted.

Fuselage.—This is made of high-tensile solid drawn tube braced with swaged wire, and built up with mechanical joints without the use of welding. There is ample room for the pilot and gunner, and a prone position for bombing can be provided.

Wings.—Arranged as a biplane with the top plane larger in chord and span than the bottom plane. The construction is entirely in high-tensile strip steel and solid drawn tube and bracing wires, except the covering, which is of fabric. The interplane struts are streamline tubes. The ailerons are on the top plane only, and have horn balance.

Tail.—The tail plane and rudder are of similar steel construction to the wings. The elevators and rudder are both balanced.

Engine Installation.—The "Jaguar" engine is mounted on a pressed-steel bearer which can be detached with the engine by undoing four bolts. The magnetos and carburettor are accessible through large doors in the fuselage. The petrol supply is by gravity from a 75-gall. tank in the fuselage. Extra tanks can be carried on the wings to increase the range. The "Jaguar" engine may be supercharged or unsupercharged, and the airscrew may be geared or ungeared. The performances given are for a geared engine unsupercharged with normal petrol and 800 lbs. of military load. The petrol is enough for four hours' flying at a cruising speed of 120 miles an hour.

Undercarriage.—The oleo legs have a long travel. The first shock is taken by the displacement of oil and the suspension on the ground is by steel springs. The axle is of high-tensile steel with the wheels running on detachable sleeves.

Power Plant

Engine	"Jaguar S."
Normal h.p.	450 h.p.
Propeller drive	Geared to 0·65 to 1.
Fuel capacity	75 galls. (337·5 litres).
Placing of fuel tanks	On top of fuselage.

Main Dimensions

Span	39 ft. 7 in. (12 m.).
Overall length	27 ft. 8·5 in. (8·4 m.).
Height	10 ft. 6 in. (3·2 m.).
Top chord	6 ft. 7 in. (2 m.).
Bottom chord	5 ft. 7 in. (1·7 m.).
Gap	5 ft. 6 in. (1·6 m.).
Surface of main planes	391 sq. ft. (36·3 m.²).

Weights and Loading

Weight empty	2,550 lbs. (1,147·5 kg.).
Load carried	1,470 lbs. (661·5 kg.).
Total loaded weight	4,020 lbs. (1,809 kg.).
Wing loading	10·03 lbs./sq. ft. (49·8 kg./m.²).
Power loading	9 lbs./h.p. (4·02 kg./.CV).

Performance

Speed at ground level	146 m.p.h. (235 km./hr.).
,, 5,000 ft.	143 m.p.h. (230·2 km./hr.).
,, 10,000 ft.	135 m.p.h. (217·3 km./hr.).
Landing speed	55 m.p.h. (88·5 km./hr.).
Climb to 5,000 ft. (1,525 m.)	4 mins.
,, 10,000 ft. (3,050 m.).	9½ mins.
,, 15,000 ft. (4,570 m.).	20 mins.
Absolute ceiling	19,000 ft. (5,791 m.).
Service ceiling	18,000 ft. (5,486 m.).
Range at cruising speed	480 miles (772·8 km.).

AVRO "BUFFALO"

One Napier "Lion XI" Engine

GENERAL

THE "Buffalo," designed and constructed by A. V. Roe and Co., Ltd. of Manchester and Southampton, is a two-seater torpedo carrying and bombing aircraft, fitted with a Napier "Lion" Series XI engine. This aircraft is specially designed for operation from an aircraft carrier, and its overall dimensions, both with wings spread and folded, are suitable for this class of work. The controllability is particularly good and the fuselage decking and nose shape is so formed as to give the best view to the pilot both for deck landing and torpedo sighting. A bombing station is provided in the floor of the fuselage so that the observer can lie in a prone position and sight through a large sliding window in the bottom of the fuselage. W/T apparatus, camera, etc., are carried.

Fuselage.—The fuselage is of tubular steel construction, with pin joints and swaged steel tie rods for bracing. The construction is very simple and easy to repair. The decking is formed of duralumin sheet and the remainder of the fuselage is fabric covered.

Wings.—The wings have an aerofoil section designed for minimum C.P. movement and a high maximum lift coefficient. They are constructed on "I" sectioned spruce spars, with Warren girder ribs and tubular steel drag struts. Balanced ailerons are fitted to both top and bottom planes and Handley Page slots of the control type are arranged to work in conjunction with the ailerons. The wings are covered with linen fabric, sewn on and doped in the standard manner. The wings have a slight dihedral and considerable sweepback. Wings of steel construction can be supplied if required.

Tail.—The tail unit is of tubular steel construction throughout, with fabric covering. Both the elevators and rudder are balanced and the tail plane incidence is adjustable from the pilot's seat.

Engine Installation.—The Napier "Lion" Series XI engine is mounted on a built up steel engine mounting, and is carefully cowled. The radiator is of the retractable type and projects below the fuselage when in the above position. Both the main petrol tank and the gravity tank are carried inside the fuselage and all fuel and oil piping joints are made with metallic couplings.

Undercarriage.—The undercarriage is of the split axle type, so as to allow a free drop for the torpedo and bombs. Long travel "Oleo" shock absorbers are incorporated and compression rubbers are employed for the taxi-ing springs. The undercarriage is specially designed for deck landing. The tail skid is of robust construction with the compression rubber springing and manganese steel wearing shoe.

Power Plant

Engine	Napier "Lion" Series XI.
Total horse-power	553 b.h.p. (normal r.p.m.)
Propeller drive	Reduction gear 0·5305 :1·0
Fuel capacity	160 gallons.
Placing of fuel tanks	In fuselage.

Main Dimensions

Wing span (top)	46 ft. 0 in. (14·02 m.).
Wing span (bottom)	46 ft. 0 in. (14·02 m.).
Wing chord (top)	7 ft. 11 in. (2·42 m.).
Wing chord (bottom)	7 ft. 11 in. (2·42 m.).
Wing area	684 sq. ft. (63·5 m.²).
Length o.a.	37 ft. 3 in. (11·36 m.).

Weight and Loading

Weight empty	4,233 lbs. (1,919 kg.).
Load carried	3,187 lbs. (1,445 kg.).
Total loaded weight	7,420 lbs. (3,364 kg.).
Wing loading	10·85 lb./sq. ft. (53 kg./sq. m.)
Power loading	13·31 b./b.h.p. (6·08 kg./CV.).

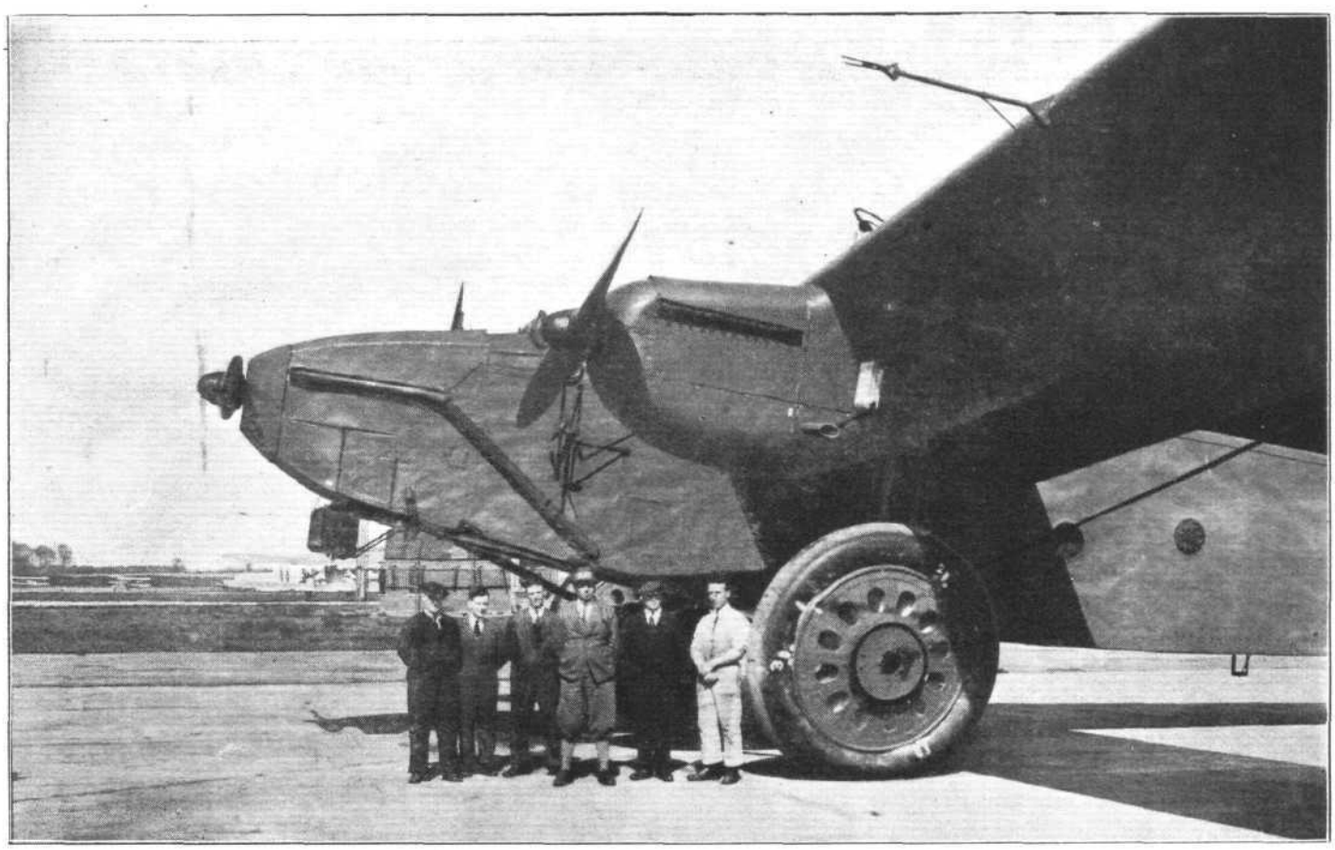
Performance

Speed at ground level	135 m.p.h. (217 km./hr.).
Speed at 5,000 ft. (1,525 m.)	132 m.p.h. (212·5 km./hr.).
Speed at 10,000 ft. (3,050 m.)	123 m.p.h. (198 km./hr.).
Landing speed	60 m.p.h. (96·6 km./hr.).
Climb to 5,000 ft. (1,525 m.)	8 mins.
Climb to 10,000 ft. (3,050 m.)	21 mins.
Service ceiling	13,700 ft. (4,175 m.).
Absolute ceiling	15,700 ft. (4,785 m.).
Range at full throttle	440 miles (700 km.).

"Everling Quantities" (590 h.p. max.)

High-speed figures	18·5
Distance figure	4·5
Altitude figure	5·25

FLIGHT



BEARDMORE "INFLEXIBLE"

Three Rolls-Royce "Condor" Engines

THE "Inflexible," built at the Dalmuir works of Wm. Beardmore and Co., Ltd., is in many ways one of the most remarkable aeroplanes of modern times. With a wing span of 158 ft. and a weight of more than 15 tons, this is certainly one of the largest machines actually flying, although types are reported to be under construction abroad which promise to eclipse the "Inflexible" in point of weight, if not in the matter of wing span.

The "Inflexible" owes its inception to the German designer Dr. Rohrbach, although the design staff at Dalmuir, headed by Mr. W. S. Shackleton, who has now, for reasons connected with his health, transferred to Australia, naturally did a large amount of the detail work. The machine is a high-wing monoplane, and should be very efficient aerodynamically. The large span assists in reducing induced drag, while the fuselage, in spite of its *actual* size, forms a very small percentage of the wing span. The two wing engines, too, although they are Rolls-Royce "Condors" of 700 h.p. each, appear almost ridiculously small under wings of such large dimensions, and altogether there can be little doubt that the aero dynamic design is very efficient.

Turning to the structural side, it is much to be regretted that Wm. Beardmore and Co. refuse to divulge anything whatever concerning the empty weight of the machine, and of the proportion between tare weight and gross weight. Without knowing anything of these, it is impossible to form any idea as to whether the machine is likely to be of practical use.

As an experiment in large-scale research it is certainly very interesting, and at least it can be claimed that the machine has flown and is reported to handle very well indeed. That in itself is something of an achievement, since the problems connected with the control of such a large machine might well have proved somewhat difficult. It might be pointed out that balances of an unusual form are employed so as to lighten the loads on the pilot's controls, while in the case of the rudder a servo-rudder, of the type originated by Herr Anton Flettner, is fitted. This type of servo-rudder has been experimented with a good deal in England during recent years and appears to perform its functions well. Without going into detail concerning its action, it may be pointed out that the pilot operates the servo-rudder which, under the action of the air forces upon it, in turn actuates the main rudder. Thus, as the servo-rudder itself can, if necessary, be balanced, it would appear that control surfaces of any size can be operated.

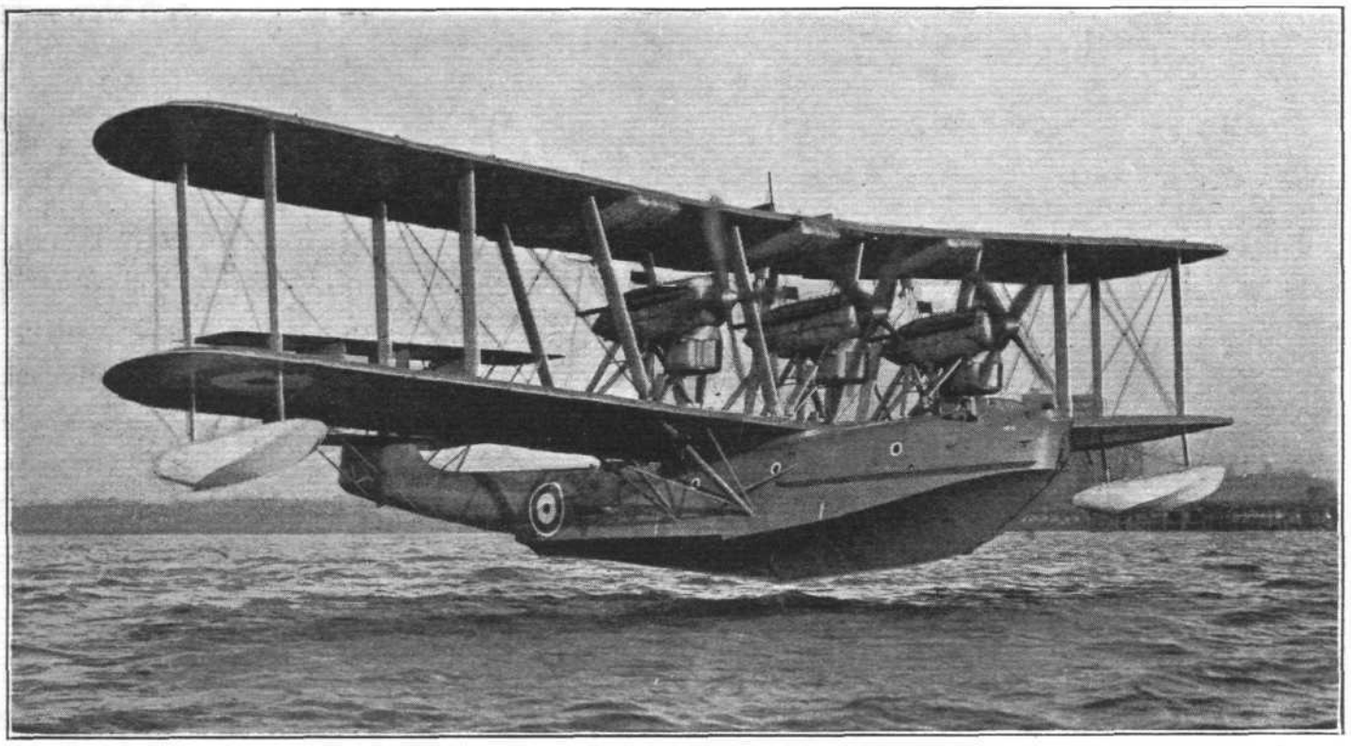
The "Inflexible" is of all-metal construction, and in this instance the wing and fuselage coverings are not excepted, as these also are of metal and, in fact, form part of the stress-bearing structure. The fuselage is of rectangular section, with an internal framework of Duralumin, covered with flat Duralumin sheet.

The monoplane wing is set at a pronounced dihedral angle, and is, like the fuselage, built entirely of metal, mainly Duralumin. Dr. Rohrbach makes use of a form of construction in which the front and rear spar, together with the wing covering, form a box, to the front and rear of which are attached the leading and trailing edges. By varying the thickness and number of laminations in the covering, the strength can be proportioned to the stresses at any point. Although the wing is designed as a cantilever beam, there is a single wire on each side bracing it. This wire is, perhaps, to be regarded as a torque wire rather than a lift wire, and is attached to the rear spar, or rather, to the rear corner of the box formed by the two spars and the covering. Thus, in a steep dive, with the centre of pressure situated well aft, the wire helps the wing structure to resist torsion.

Of the three Rolls-Royce "Condor" engines, one is mounted in the nose of the fuselage, while the other two are slung under the wing, some distance outboard. The radiators for the outboard engines are mounted under the wing, between the engine nacelle and the fuselage.

The undercarriage telescopic struts are taken to the wing, while horizontal Vees take the place of the usual single axle. The large Dunlop wheels are provided with brake drums, the mechanism being so arranged that the tail skid takes a part in the operation of the brakes As soon as there is a load on the tail skid the brakes are applied, but should the brake pressure be too great, so that there is a tendency for the machine to nose over, the mere fact of the skid leaving the ground immediately releases the brakes.

The "Inflexible" is a very interesting experiment, and the results of exhaustive tests should be of very considerable value to the future development of the large aeroplane.



["FLIGHT" *Photograph*

THE BLACKBURN "IRIS II"

Three Rolls-Royce "Condor" Engines

GENERAL

THE "Iris II" flying-boat designed by the Blackburn Aeroplane Co. Ltd., of Leeds, has an all-metal hull and is driven by three Rolls-Royce "Condor" engines. It is a reconnaissance and coastal patrol machine with bomb racks adaptable to bombs of various weights and numbers. Machine guns are also included in the armament.

Hull.—The hull is of a rigid type construction and almost entirely of duralumin: the exception being the attachment fittings for the main planes and tail planes, which are of stainless steel. The design provides for comparatively widely space transverse frames of full section, including the planing bottom structure integral with the hull, and longitudinal stringers. Frames are attached to a central keelson which is continuous throughout the length of the hull. The latter has two steps, a deep fore foot, and is well flared to keep down spray. This gives clean running, rapid and easy take-off, and it reduces resistance to a minimum. It accommodates a crew of five. There are fore and aft gunners and the pilot, second pilot and navigator are all placed well forward of the superstructure.

Wings.—These are of biplane structure, braced in two bays on each side of the centre planes. They are of equal span and chord and of composite construction; the spars and ribs being wood and internal bracing duralumin tubular drag struts and steel tie rods. Balanced ailerons are on top and bottom planes, and wing floats under the bottom planes.

Top centre plane is constructed similarly to the main planes, but the bottom centre plane built on top of the hull is metal with the exception of the ribs. The spars are of steel tubing.

Tail.—This unit is constructed like the main planes. There are two fins and three rudders; the top tail plane and elevator being of greater span than the bottom. Outer rudders are of balanced type and linked to the centre rudder which is a Servo rudder.

Engine Installation.—Each engine unit is a built-up duralumin cradle, readily detachable from the steel tubular mounting structure carrying the engine itself. In each unit are cooling system, oil system and starting gear.

Power

Engines	3 Rolls-Royce "Condors IIIA"
Total horse-power	1,950 b.h.p.
Propeller drive	Geared.
Fuel capacity	680 gals. (3,060 litres) normal; 1,000 gals. (4,500 litres) overload.
Placing of fuel tanks	Below top centre plane.

Main Dimensions

Wing span (top)	95 ft. 6 in. (29·1 m.).
Wing span (bottom)	95 ft. 6 in. (29·1 m.).
Wing chord (top)	13 ft. 6 in. (4.1 m.).
Wing chord (bottom)	13 ft. 6 in. (4·1 m.).
Wing area	2,460 sq. ft. (221·4 m.^{2}).
Length o.a.	67 ft. 1 in. (20·4 m.).

Weights and Loading

Weight empty	17,350 lbs. (7,890 kg.).
Load carried	4,000 lbs. (1,818 kg.).
Total loaded weight	27,000 lbs. (12,260 kg.).
Wing loading	11 lbs./sq. ft. (53·8 kg./m.^{2}).
Power loading on (1,950 h.p.)	13·4 lb./h.p. (6 kg./CV).

Performance

Speed at sea level	103 knots (191 km./h).
Cruising speed	80 knots (148 km./h).
Landing speed	50 knots (92 km./h).
Climb from sea level	700 ft./min. (213·3 m/min.).
Absolute ceiling	14,000 ft. (4,267 m.).

["FLIGHT" *Photograph*

THE BOULTON & PAUL "SIDESTRAND"

Two Bristol "Jupiter" Engines

GENERAL

THE "Sidestrand" designed by Boulton and Paul, Ltd., of Norwich, is an all-metal three-seater, high-performance bomber, powered by two Bristol "Jupiter VI" radial air-cooled engines. In addition to the bomb load, the "Sidestrand" carries machine guns in the forward gun turret in the nose, and on the aft turret behind the wings. A prone gun position is also provided for the rear gunner.

Fuselage.—Of tubular construction, the tubes being of the "locked-joint" type, manufactured from flat steel strip. The joints between longerons and struts are effected by bolting, magnesium alloy "pads" with flat faces on their outer sides being slipped over longerons and strut ends. The bracing is by tie rods. The fuselage is of good streamline shape and has very low air resistance.

Wings.—Arranged in the form of an equal-span biplane, the wings are of all-metal construction, steel being the material chiefly used. The wing spars are built up from flat steel strip, rolled and drawn to the desired section, the strips of which the spar is composed being joined by riveting. The wing ribs have channel section flanges and girder webs formed of short lengths of tube. The wing covering is fabric. Ailerons with Frise balances are fitted to both top and bottom wings.

Tail.—Like the wings, the tail is of all-metal construction as regards its structure, and the covering is fabric. Horn balances are provided for rudder as well as elevator.

Engine Installation.—The two "Jupiter VI" engines are mounted outboard on the lower wing, on steel tube structures designed to avoid placing torque-reaction stresses on the wing spars. The mountings are of the hinged type, which permit of swinging the engine out for inspection and adjustments. There are three petrol tanks, placed in the fuselage, comprising a front main tank, an aft main tank, and a service tank.

Undercarriage.—Of simple two-wheeled type, with oleo-pneumatic telescopic legs of long stroke, giving excellent shock-absorbing qualities. The wheel axles are of the bent type, hinged to the lower longerons of the fuselage. Thus there is no obstruction below in the way of dropping bombs, etc.

Power Plant

Engines	2 Bristol "Jupiter VI."
Total horse-power	900 b.h.p.
Propeller drive	Direct.
Fuel capacity	225 gallons (1,013 litres).
Placing of fuel tanks	In fuselage.

Main Dimensions

Wing span (top)	72 ft. 0 in. (21·95 m.).
Wing span (bottom)	72 ft. 0 in. (21·95 m.).
Wing chord (top)	7 ft. 0 in. (2·133 m.).
Wing chord (bottom)	7 ft. 0 in. (2·133 m.).
Wing area	943·5 sq. ft. (87·6 m.²).
Length o.a.	40 ft. 8 in. (12·4 m.).

Weight and Loading

Weight empty	5,275 lbs. (2,400 kg.).
Load carried	3,575 lbs. (1,625 kg.).
Total loaded weight	8,850 lb. (4,025 kg.).
Wing loading	9·37 lb./sq. ft. (45·9 kg/m.²).
Power loading (on 900 h.p.)	9·84 lb./h.p. (4·47 kg./CV).

Performance

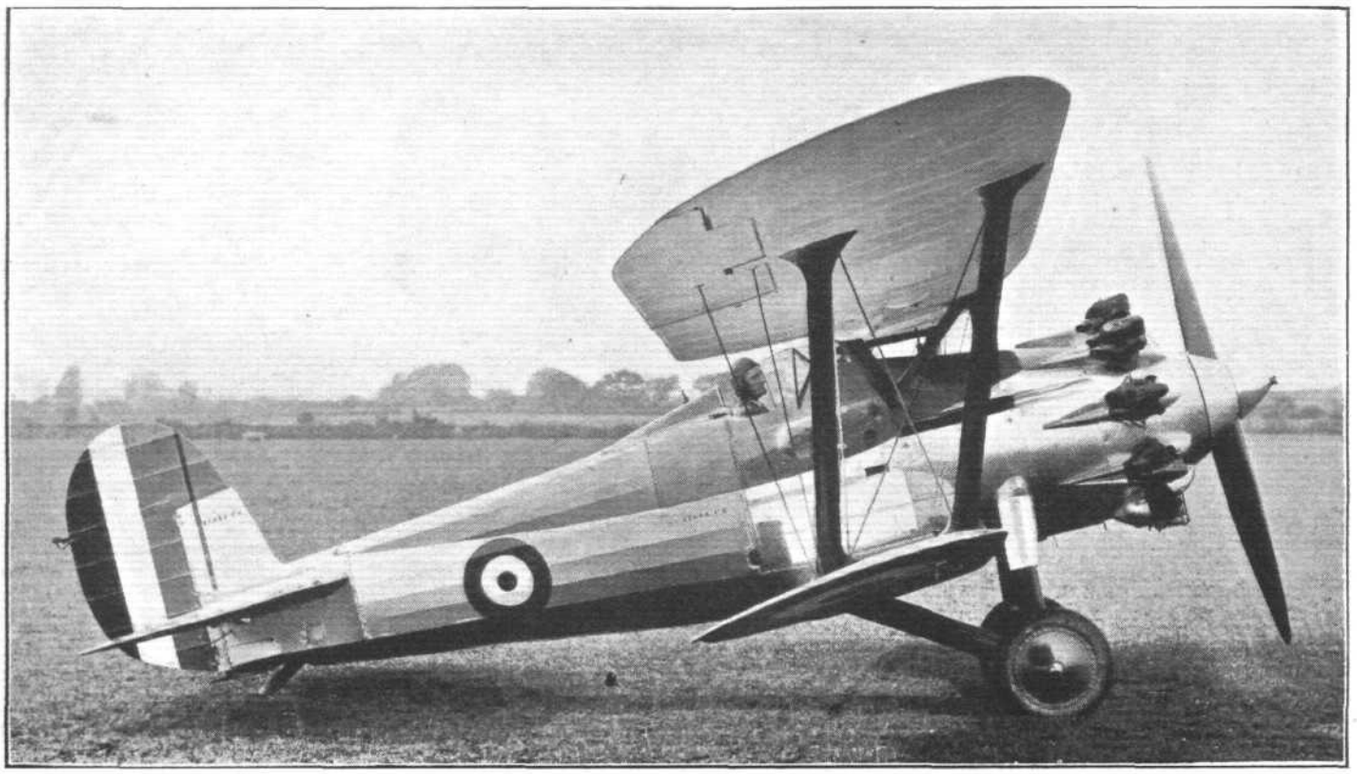
Speed at ground level	125 m.p.h. (201 km./h.).
Speed at 5,000 ft. (1,525 m.)	130 m.p.h. (209 km./h.).
Speed at 10,000 ft. (3,050 m.)	129 m.p.h. (207·7 km./h.).
Speed at 15,000 ft. (4,570 m.)	122 m.p.h. (196·5 km./h.).
Landing speed	50 m.p.h. (80·6 km./h.).
Climb to 10,000 ft. (3,050 m.)	10·5 mins.
Climb to 15,000 ft. (4,570 m.)	19 mins.
Service ceiling	21,500 ft. (6,560 m.).
Absolute ceiling	23,000 ft. (7,000 m.).
Range at full throttle	750 miles (1,200 km.).

"Everling Quantities"

High-speed figure $\frac{\eta}{2k_D} = 16$

Distance figure $\eta \frac{L}{D} = 3{\cdot}5$

Altitude figure $\eta \frac{L}{D} \sqrt{2k_L} = 6{\cdot}25$



THE "BRISTOL" SINGLE-SEATER FIGHTER

One Bristol "Jupiter" Engine

GENERAL

THE Bristol single-seater fighter exhibited at the Paris Aero Show was designed and built by the Bristol Aeroplane Co., Ltd., of Filton, Bristol, and is an all-metal machine in which the material of construction is mainly steel, and more particularly sections formed from flat steel strip, the Bristol firm having done a great deal of research work on this type of construction during the last few years. The machine carries the usual single-seater fighter armament in the form of two machine guns firing "through" the propeller.

Fuselage.—Entirely of metal construction, with the exception of the fabric covering. The front portion is of circular section steel tube construction, but the rear portion, from the pilot's cockpit to the tail, has longerons and struts of strip steel, formed to somewhat unusual sections.

Wings.—Arranged in the form of an unequal span, unequal chord biplane, the wings are, with exception of the fabric covering, of all-steel construction. The spars are built up from steel strip, flanges and webs being joined by riveting. In a later type of Bristol spar only a very small number of rivets are used, the "curled" edge of the strip serving to bind the parts together. The wing ribs are of channel section, but a section which has ridges and "curls" to prevent buckling, thus making the use of very thin material possible. Both upper and lower wings have their trailing edges cut away in the centre to improve the view. Frise ailerons are fitted to the top plane only.

Tail.—Both vertical and horizontal tail surfaces are of cantilever type, with a rather unusual trimming gear for the tail plane. It is of steel construction and fabric covered.

Engine Installation.—The "Jupiter" engine is particularly neatly mounted in the nose, and the cylinders are carefully cowled for streamlining. The petrol tanks are in the top plane, and direct gravity feed to the engine is employed, avoiding the use of pumps.

Undercarriage.—Oleo-pneumatic, with long travel. The telescopic front legs are attached at their upper ends to the *top* longerons instead of to the bottom, and are neatly faired into the fuselage covering.

Power Plant

Engine	Bristol "Jupiter."
Total horse-power	420 b.h.p.
Propeller drive	Direct.
Fuel capacity	70 gallons (315 litres).
No. and placing of fuel tanks	Two, in top plane.

Main Dimensions

Wing span (top)	33 ft. 10 in. (10·32 m.).
Wing span (bottom)	27 ft. 6 in. (8·38 m.).
Wing chord (top)	6 ft. 4 in. (1·93 m.).
Wing chord (bottom)	4 ft. 9 in. (1·45 m.).
Wing area	307·15 sq. ft. (28·55m.²).
Length o.a.	24 ft. 10 in. (7·6 m.).

Weights and Loading

Weight empty	1,990 lbs. (905 kg.).
Load carried	1,135 lbs. (516 kg.).
Total loaded weight	3,125 lbs. (1,421 kg.).
Wing loading	10·17 lbs./sq. ft.(49·8kg./m.²).
Power loading (on 420 b.h.p.)	7·44 lbs./h.p. (3·385 kg./CV).

Performance

Speed at ground level	148 m.p.h. (238 km./h.).
Speed at 5,000 ft. (1,525 m.)	156 m.p.h. (251 km./h.).
Speed at 10,000 ft. (3,050 m.)	176 m.p.h. (283 km./h.).
Speed at 15,000 ft. (4,570 m.)	176 m.p.h. (283 km./h.).
Speed at 20,000 ft. (6,100 m.)	172 m.p.h. (277 km./h.).
Speed at 25,000 ft. (7,620 m.)	166 m.p.h. (267 km./h.).
Speed at 28,000 ft. (8,540 m.)	154 m.p.h. (248 km./h.).
Speed at 29,200 ft. (8,900 m.)	149 m.p.h. (240 km./h.).
Climb to 5,000 ft. (1,525 m.)	2·9 mins.
Climb to 10,000 ft. (3,050 m.)	5·4 mins.
Climb to 15,000 ft. (4,570 m.)	8·2 mins.
Climb to 20,000 ft. (6,100 m.)	12·1 mins.
Climb to 25,000 ft. (7,620 m.)	18·8 mins.
Climb to 29,200 ft. (8,900 m.)	31·0 mins.
Absolute ceiling	30,300 ft. (9,240 m.).

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

THE CIERVA "AUTOGIRO" "C.8. MARK II."

Two-Seater, Dual Control, with 180 H.P. "Lynx" Engine

GENERAL

As is now generally known, a more or less standard type of "Autogiro" has been evolved combining the advantages of safety which are characteristic of this invention, with performance possibilities of the ordinary fixed wing aeroplane. This type embodies the construction and a number of components of the Avro "Lynx" Training Aircraft 504/N, in so far as applicable with the autogiro rotor in place of the fixed wings.

Fuselage.—Standard Avro type of construction modified where necessary to accommodate the Autogiro rotor system.

Undercarriage and Tail Skid.—Two-wheel, with wide track and oleo and compression rubber legs. Steerable tail skid with compression rubber springs.

Rotor System.—Four blades, doubly articulated. Central hub running on four ball bearings (two radial, two thrust); loads transmitted to structure by cabane of four steel tube struts.

Rotor Blades.—Single steel tube spar, spruce ribs, fabric covered; leading edge reinforced with 3-ply top and bottom. Adjustable, easily accessible weights at blade tips for balancing.

Auxiliary and Control Surfaces.—Stabilising monoplane, semi-cantilever, spruce spars covered 3-ply and fabric throughout, carrying normal type unbalanced ailerons. Adjustable tailplane and elevators horn balanced, and balanced rudder of standard Avro type.

Accommodation and Pilots' Controls.—Two cockpits in tandem with complete dual control, including tail trimming gear. Rotor lateral trimming gear in front cockpit. Machine and engine controls are of standard type.

Removable balance weights in after end of fuselage to allow of machine being flown as single seater from front cockpit.

Power Plant

Engine	Armstrong-Siddeley "Lynx IV"
Total horse-power	210 b.h.p.
Propeller drive	Direct.
Fuel capacity	24 gallons (108 litres).
Placing of fuel tanks	In fuselage.
Fuel supply	Direct gravity feed.

Main Dimensions

Diameter of rotor	39 ft. 8 in. (12·1 m.).
Length o.a.	36 ft. 0 in. (11 m.).
Overall height—	
Tail down	14 ft. 9 in. (4·5 m.).
Tail up	13 ft. 0 in. (3·96 m.).
Span of stabilising plane	23 ft. 2 in. (7 m.).
Span of ailerons	7 ft. 3 in. (2·21 m.).
Wheel track	11 ft. 0 in. (3·35 m.).

Weights and Loading

Weight empty	1,735 lbs. (790 kg.).
Fuel (24 gallons)	182 lbs. (83 kg.).
Oil (3½ gallons)	35 lbs. (16 kg.).
Crew (two)	360 lbs. (164 kg.).
Extra disposable load	50 lbs. (22·7 kg.).
Total loaded weight	2,380 lbs. (1075·7 kg.).

Performance

Maximum speed (sea level)	100 m.p.h. (153 km./h.).
Cruising speed	85 m.p.h. (129 km./h.).
Minimum speed	25 m.p.h. (40 km./h.).
Rate of climb (sea level)	500 ft./min. (2·54 m./sec.).
Endurance (at cruising speed)	3 hours.
Normal rotor speed	115 r.p.m.

["FLIGHT" *Photograph*

THE DE HAVILLAND D.H. 60 X "MOTH"

A.D.C. "Cirrus" Engine

GENERAL

THE X type "Moth" designed by The de Havilland Aircraft Co., Ltd., is one of the most well-known two-seater light aeroplanes. It can be fitted with land undercarriage, skis or floats, and in these three forms is suitable for undertaking a great variety of duties.

Fuselage.—This is of three-ply construction with spruce longerons and web members. The passenger is situated between the planes with the pilot at his immediate rear. Full dual control is fitted, the forward "joy-stick" being detachable and the remaining gear being covered up by a robust hinged cowling.

Wings.—Arranged in the form of a single-bay equal-span biplane, the structure, with the exception of tubular drag struts and wires, is of spruce, and is of orthodox design. The wings fold easily against the fuselage by the swinging into position of two jury struts and the withdrawal of four spring-loaded bolts.

Engine Installation.—The A.D.C. "Cirrus" engine is bolted direct to the fuselage sides. A streamline petrol tank in the top centre section feeds the carburettor by gravity. Two gallons of oil are carried in the sump, no tank being required. Special attention has been paid to the accessibility of all engine accessories—filters, magnetos, carburettor, etc. Starting up by swinging the propeller is made an easy operation by the installation of an impulse starter on one magneto.

Undercarriage.—The chassis is of conventional design, having the usual axle, radius rods, bracing cables and shock-absorber legs. The latter are fitted with rubber compression blocks housed in a circular tubular casing, 600 × 100 mm. wheels and tyres are fitted as standard.

Power Plant

Engine	A.D.C. "Cirrus" Mark II.
Total horse-power	84 b.h.p.
Propeller drive	Direct.
Fuel capacity	19 gallons (86·3 litres)
Oil capacity	2·0 gallons (9·1 litres).
Fuel supply	Direct gravity.

Main Dimensions

Span—top and bottom planes open	30 ft. 0 in. (9·15 m.).
Span—folded	9 ft. 10 in. (3·00 m.).
Chord—top and bottom planes	4 ft. 4⅜ in. (1·33 m.).
Length—overall	23 ft. 8½ in.(7·23 m.).

Weights and Loading

Tare weight	885 lbs. (401 kg.).
Crew at 160 lbs. (72·5 kg.) each	320 lbs. (145 kg.).
Petrol—19 gallons (86·3 litres)	140 lbs. (63 kg.).
Oil 2·0 gallons (9·1 litres)	20 lbs. (9 kg.).
Luggage (to make up maximum total weight)	185 lbs. (84 kg.).
Maximum total weight	1,550 lbs. (702 kg.).
Wing loading	6·37 lbs./sq. ft. (31·1 kg./m.²).
Power loading	18·5 lbs./h.p. (8·38 kg./CV).

Performance

Full speed at ground level	102 m.p.h. (164 km./h.).
Full speed at 5,000 ft. (1,525 m.)	97 m.p.h. (158 km./h.).
Cruising speed at 1,000 ft.	80-85 m.p.h. (129-137 km./h.)
Landing speed	44 m.p.h. (71 km./h.).
Climb to 5,000 ft. (1,525 m.)	14 mins.
Climb to 10,000 ft. (3,050 m.)	37 mins.
Absolute ceiling	14,000-15,000 ft. (4,300 4,600 m.).
Range (5 hours)	410 miles (660 km.).

["FLIGHT" *Photograph*

THE DE HAVILLAND D.H. 61 "CANBERRA"

One Bristol "Jupiter" Engine

GENERAL

THE "Canberra," designed by the de Havilland Aircraft Co., Ltd., is a cabin machine carrying six passengers in real comfort with a good margin for luggage, and the possibility, when occasion demands, of carrying eight passengers. A float undercarriage, interchangeable with the land chassis, adds greatly to the utility of the machine.

Fuselage.—This is built up of complete units constructed of spruce members with three-ply covering. The cabin has been designed with a view to giving the passengers the maximum degree of comfort. The windows are arranged to slide horizontally, and the adjustment of these, and a large cowl ventilator which diffuses cold, or warm air through the roof, makes it possible to vary the temperature at will. The seats, which are quickly detachable, and can be folded into a small space, make it possible for the machine to be used for carrying freight.

Wings.—Designed as a two-bay equal span biplane, the planes are constructed mainly of spruce with the exception of the tubular steel drag struts. The wings have been arranged to fold against the fuselage, no jury struts being required.

Undercarriage.—The chassis is of the split-axle type, the axles being arranged to cross each other. In conjunction with the wide fuselage this undercarriage gives an ample track, and provides maximum ground clearance. Rubber-in-compression legs of streamline section take the landing shocks.

Engine Installation.—The Bristol "Jupiter," Mark XI is mounted on a duralumin plate; this is attached to the front of the fuselage by a steel tubular structure. An oil tank carrying above it in the slipstream an oil cooler, forms the top engine cowling. A streamline tank, mounted within the top centre section of the main planes, having a capacity of 80 or 120 gallons, at the option of the purchaser, connects to the carburettors by gravity feed through petroflex tubing.

Power Plant

Engine	1 Bristol "Jupiter," Mark XI.
B.H.P. at 2,000 r.p.m.	460 h.p.
B.H.P. at 2,200 r.p.m.	500 h.p.
Propeller gear ratio	2 : 1.
Fuel capacity	80 or 120 gallons (363 or 544 litres).
Oil capacity	14 gallons (63 litres).

Main Dimensions

Span—top and bottom planes (open)	52 ft. 0 in. (15·85 m.).
Span—folded	17 ft. 6 in. (5·33 m.).
Chord—top and bottom planes	6 ft. 6 in. (1·98 m.).
Wing area	613 sq. ft. (56·9 m.²).
Length overall	39 ft. 0 in. (11·90 m.).
Wheel track	8 ft. 0 in. (2·44 m.).

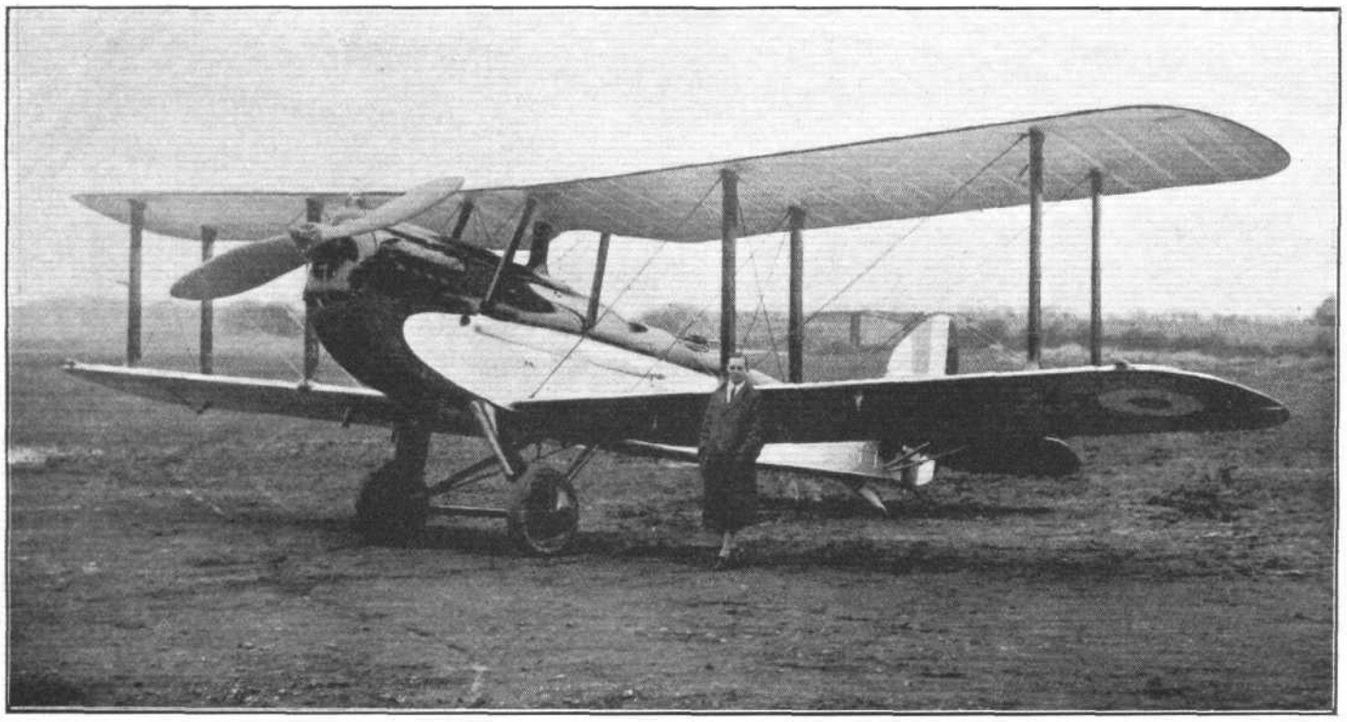
Weights and Loadings

Weight empty (tare) land machine	3,650 lbs. (1,655 kg.).
Load carried (including fuel and crew) land machine	3,350 lbs. (1,520 kg.)
Total loaded weight	7,000 lbs. (3,170 kg.).
Wing loading	11·42 lb./sq. ft. (55·7 kg./m.²).
Power loading (500 h.p.)	14·00 lb./h.p. (6·35 kg./C.V.)

Performance for Land Machine and Seaplane

Speed at ground level	132 m.p.h. (212 km./h.).
Speed at 5,000 ft. (1,525 m.)	127 m.p.h. (204 km./h.).
Speed at 10,000 ft. (3,050 m.)	120 m.p.h. (193 km./h.).
Cruising speed at normal altitude	110 m.p.h. (177 km./h.).
Landing speed	54 m.p.h. (87 km./h.).
Rate of climb at ground level	900 ft./min. (4·57 m./sec.).
Absolute ceiling	18,000 ft. (5,490 m.).
Service ceiling	16,000 ft. (4,890 m.).
Range with 80 gallons (363 litres) petrol	430 miles (691 km.).
Range with 120 gallons (544 litres) petrol	650 miles (1,042 km).

The above performance figures are for a total loaded weight of 6,200 lb. (2,820 kg.).



["FLIGHT" *Photograph*

DE HAVILLAND "HOUND"

One Bristol "Jupiter" VIII or Napier XI Engine

GENERAL

THE "Hound" designed by the de Havilland Aircraft Co., Ltd., is a general purpose two-seater fighter fitted with a Bristol "Jupiter" Mark VIII. In addition to a bomb load of approximately 450 lbs. (205 kg.) arranged in various combinations, it carries one Vickers machine gun for the pilot and one Lewis machine gun mounted on a special D.H. ring for the gunner.

Fuselage.—This is of three-ply construction with spruce longerons and web members. To the rear of the engine a large compartment is arranged to carry desert equipment, etc. Two petrol tanks of 74 and 52 galls. capacity are fitted inside the fuselage, between the planes. Fuel from these feeds a 20 gall. gravity tank in the centre section by means of a windmill driven D.H. pump. The pilot is situated where his view is good in all directions, and the gunner, whose cockpit is also fitted with complete controls, has been placed immediately behind and can communicate with him without difficulty. The gunner's cockpit extends along the rear fuselage giving an excellent prone position for bombing and ample accommodation for the full military equipment.

Wings.—Arranged in the form of a two-bay equal-span biplane, the wings have duralumin oval tubular spars, and steel tubular interplane and drag struts. The secondary structure, *i.e.*, ribs, etc. are of spruce. Four ailerons are fitted and are operated by the D.H. differential control.

Engine Installation.—The Bristol "Jupiter' Mark VIII engine is mounted on a duralumin plate; this is connected to the front fuselage by a steel tubular mounting. An oil tank carrying an oil-cooler is fited above this structure and forms part of the cowling.

Undercarriage.—This unit is of the split-axle type giving a wide track and ample ground clearance. It makes it possible to carry a torpedo or one heavy bomb mounted under the fuselage. The shock absorber legs are fitted with streamline rubber compression blocks encased in a duralumin fairing.

Power Plant

Engine	1 Bristol "Jupiter" Mk. VIII.
Total fuel capacity (normal)	110 galls. (499 litres).
Total fuel capacity (overload)	146 galls. (662 litres).
Oil capacity	12·5 galls. (56·6 litres).

Main Dimensions

Wing span (top and bottom)	45 ft. (13·72 m.).
Wing chord (top and bottom)	5 ft. 6 in. (1·68 m.)
Wing area	462 sq. ft. (42·8 m.²).
Overall length	33 ft. 3 in. (10·15 m.)

Weights and Loadings

Weight empty (tare) (without equipment)	2,978 lbs. (1,350 kg.).
Load carried (including fuel and crew)	2,139 lbs. (968 kg.).
Total loaded weight ..	5,117 lbs. (2,320 kg.).
Wing loading	11·10 lbs./sq. ft. (54·1 kg./m.²)
Power loading	10·55 lbs./h.p. (4·79 kg./C.V.).

Performance

Speed at 6,000 ft. (1,829 m.)	156 m.p.h. (251 km./h.).
Speed at 8,000 ft. (2,439 m.)	155 m.p.h. (249 km./h.).
Speed at 10,000 ft. (3,048 m.)	154 m.p.h. (247 km./h.).
Speed at 14,000 ft. (4,270 m.)	149 m.p.h. (240 km./h.).
Speed at 18,000 ft. (5,490 m.)	141 m.p.h. (227 km./h.).

The above are official figures from Martlesham Heath Test Station.

Landing speed	57 m.p.h. (91 km./h.).
Climb to 10,000 ft. (3,048 m.)	8·5 mins.
Climb to 15,000 ft. (4,570 m.)	15·0 mins.
Climb to 20,000 ft. (6,100 m.)	24·7 mins.
Rate of climb at 5,000 ft. (1,522 m.)	1,325 ft./mins. (4·04 m./sec.).
Service ceiling	2,400 ft. (7,320 m.)
Absolute ceiling	25,500 ft. (7,780 m.).
Range at cruising (146 galls. petrol)	1,000 miles (1,609 km.)

THE FAIREY III F

Napier "Lion" or Bristol "Jupiter"

GENERAL

ADAPTABLE to a great variety of requirements, the III F, designed and built by the Fairey Aviation Co., Ltd., is produced in two main types—as a two-seater general-purpose machine and as a three-seater Naval reconnaissance type for service with the Fleet Air Arm. The two types are almost identical in all respects save that of crew accommodation, and perform the same general functions, *i.e.*, day bombing, offensive and defensive fighting, photography, reconnaissance, gunnery spotting, &c. The three-seater carries, in addition to pilot and gunner or observer, a wireless operator who is seated between the two other occupants, in a position where he is in the closest communication with either.

By way of further extending the utility of these two types the undercarriage of the III F can be either a wheel or a float type, the fuselage structure, &c., being designed to resist the loads peculiar to the twin-float type of undercarriage. Both types are now also available in two forms of construction: mixed wood and metal, or all-metal. The following notes deal with the all-metal version, and more particularly with the general purpose two-seater type, which is the one illustrated in the photograph.

As the III F is equipped for general-purpose work, there is not the space here to refer to more than a small proportion of the equipment. The pilot's cockpit has all the usual number of instruments, &c., and a synchronised gun on the port side. The seat can be raised and lowered, and is deep enough to accommodate the seat type parachute if desired. Dividing the rear cockpit from the front is a metal bulkhead, in the lower portion of which, on the port side, are mounted airspeed indicator, altimeter and watch, so that they can be read easily by the gunner when he is lying prone for bombing, &c. The bomb sight is arranged to be mounted on the side of the trap-door opening. Below the trap door is a sliding panel in the fairing, so that no break in the fuselage lines is caused when the trap door is not in use.

In the two-seater a camera of the automatic hand-operated type is fitted, in addition to the radio equipment. If the latter is of the modified type, as supplied to the British Air Ministry, it is possible to use the camera without withdrawing the radio installation. Tapping keys are provided in both cockpits. The wireless generator is mounted on a swinging arm, so that it can be swung inboard when not in use.

The rear-gun mounting may be either of the Scarff-ring pattern or the new Fairey type, which has been specially designed to meet the requirements of a fast machine. Various bomb loads can be taken as standard equipment. For example, a total of 2 bombs of 230 lbs. (104·5 kg.) each or two of 250 lbs. (113·5 kg.) each, and four sighter bombs can be carried, or four bombs of 112 lbs. (51 kg.) each and four sighter bombs. Or two racks of 4 by 20 lb. bombs alone can be used. All bombs are carried under the main plane.

Fuselage.—Of all-metal construction, with a stiff tubular central cellule forming the structure to which are attached the welded-tube engine mounting in front and the rear portion of the fuselage at the back. Covering is of fabric at the back, and aluminium panels in front.

Wings.—Spars of drawn corrugated steel tube, of the section known as "double eight," with pressed ribs clipped to it. Covering of fabric.

Engine Installation.—The standard III F machine is equipped with Napier "Lion," but if an air-cooled power plant is desired, the machine can be fitted with the "Jupiter VIII" geared engine. The petrol system is arranged so that the pump delivers through the hand pump, so that in case of failure no time is lost in changing over.

Undercarriage.—The land type has a Vee undercarriage with oleo shock-absorbing legs, while the seaplane type has a twin-float undercarriage with Duralumin floats.

Power Plant

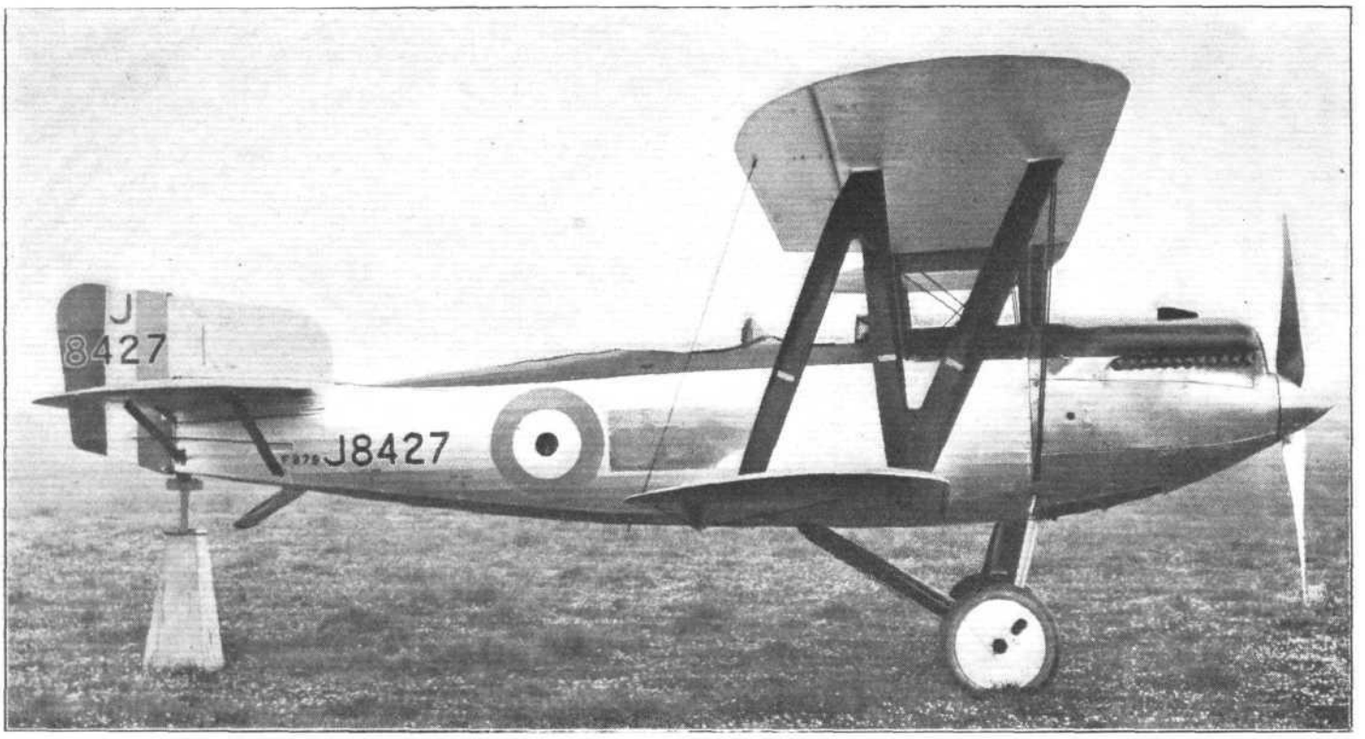
Engine	Napier "Lion" or Bristol "Jupiter."
Fuel capacity (normal) ..	124 gallons (558 litres).
Placing of fuel tanks	In fuselage.
Fuel supply	By engine pump *via* hand pump.

Main Dimensions

Wing span (top)	46 ft. 6 in. (14·18 m.).
Wing span (bottom)	46 ft. 6 in. (14·18 m.).
Length, o.a.	32 ft. 6 in. (9·95 m.).
Height	11 ft. 6 in. (3·51 m.).
Width folded	14 ft. 3½ in. (4·35 m.).

Performance

No performance figures available.



THE FAIREY "FOX"

Fairey "Felix" Engine

GENERAL

DESIGNED and built by the Fairey Aviation Co., Ltd., of Hayes, Middlesex, the "Fox" is a high-performance light day bomber in which aerodynamic efficiency has been aimed at by suppressing all projections on the fuselage. The latter is in itself of good aerodynamic form and of small cross-sectional area, this having been possible by the fitting of the Fairey "Felix D.12" engine, which has a very small frontal area. A further saving in resistance has been effected by fitting a surface radiator in addition to the retractable radiator.

The fuselage is arranged so that the gunner can lie down when bombing, a trap door in the floor of the fuselage giving him a clear view. The bomb release gear is placed close at hand, on the starboard side.

In designing the "Fox" a difficulty was encountered in connection with the tail defence of the machine, *i.e.*, with the placing and operation of the aft gun. At speeds of 225 km./h. it was found impossible for the gunner to stand up with head and shoulders clear of the cockpit, and consequently it became necessary to adopt a different arrangement. The "Fox" was, therefore, fitted with a special mounting for the after gun, and the gunner is shielded by the windscreen and is thus able to operate his gun, which covers the entire field upwards and aft.

The pilot's gun is placed on the port side, and the rear portion of the gun is readily accessible, and all normal jams can be cleared in the air. A removable panel uncovers the gun in the space of a few seconds for removal or adjustments. Needless to say, the gun is provided with the usual interrupter gear.

Fuselage—Of "mixed" construction. The central portion, which contains the cockpits, &c., and to which are secured the engine bearers at the front and the tail portion of the fuselage at the rear, is of steel tube construction ensuring rigidity and complete interchangeability of all parts. The rear portion of the fuselage is of normal girder type, with ash and spruce compression members and wire bracing. The covering is of fabric.

Wings.—These are of normal two-spar construction, with built-up silver spruce spars of box section, and wooden ribs. The covering is fabric, and the wing section used is one of very low minimum drag. The biplane arrangement of the wings is of fairly normal proportions, but a noteworthy feature is that in spite of the fact that the machine is in the bomber class, but a single pair of struts on each side is used. This has been made possible by keeping the machine small and light, the effect of weight being cumulative.

Engine Installation.—The Fairey "Felix D.12" engine is, as already pointed out, of small frontal area, and it is also of low weight (300 kgs.). In spite of this, however, the engine is complete, and the starter and starting magneto are incorporated as a part of the engine, together with petrol pumps, etc. The engine is very carefully cowled in, and the various auxiliaries are driven direct, thus eliminating the resistance of windmill drives. The cooling system is so arranged that, when starting up, hot water from the cylinders is by-passed to the oil temperature regulator and thereby rapidly heats the oil. In practice the throttle can be opened up after five or six minutes, so that one of the objections to water cooling is greatly reduced. The use of a Fairey metal airscrew has several advantages in addition to the greater efficiency. For example, the metal airscrew is immune from damage when flying through rain, hail, etc., while being also unaffected by adverse climatic conditions involving extreme variations in temperature, etc.

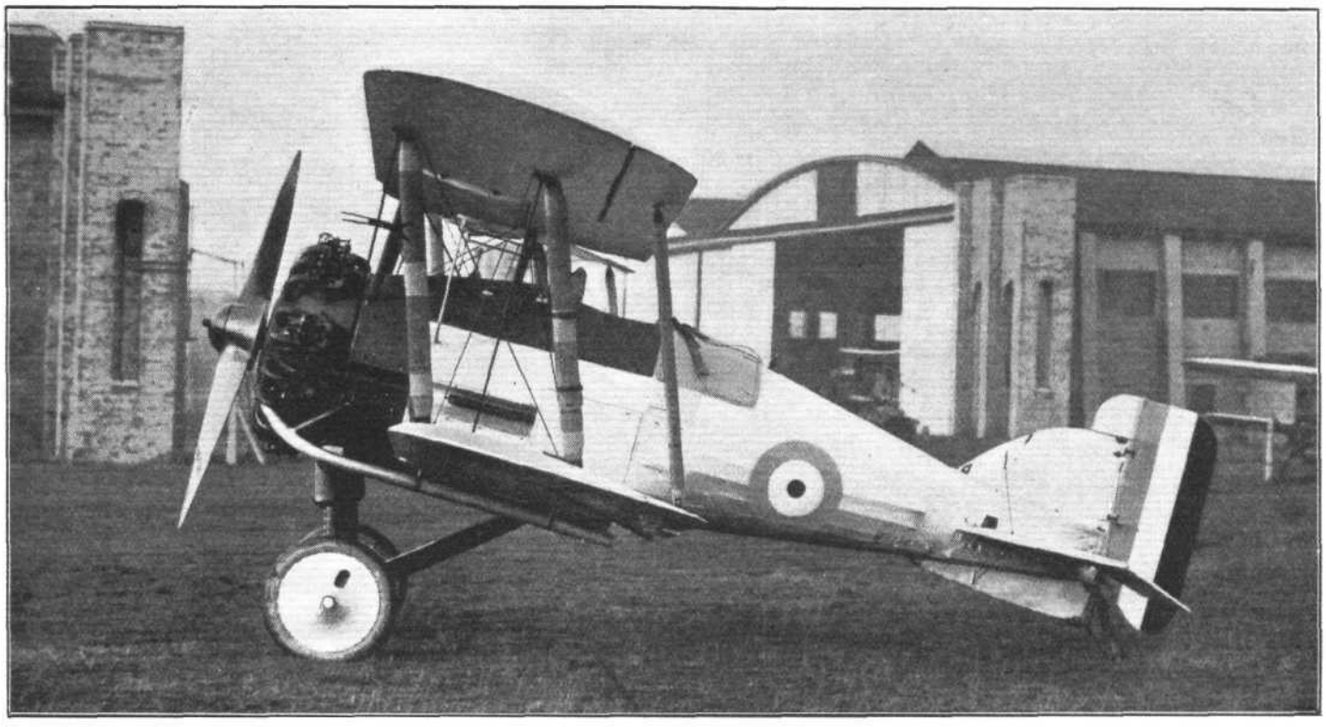
Undercarriage.—Of simple V-type, with cross axle and shock absorption in the form of a special patented arrangement of rubber balls working as compression rubbers. This type of shock absorption has been found very effective, while at the same time being simple, cheap and requiring little maintenance.

Power Plant

Engine	Fairey "Felix D.12."
Normal power	430 b.h.p. at 2,100 r.p.m.
Maximum power	460 b.h.p. at 2,300 r.p.m.
Placing of fuel tanks	In fuselage.

Main Dimensions

Wing span (top)	38 ft. (11·58 m.).
,, (bottom)	32 ft. 3 in. (9·84 m.).
Wing chord (top)	7 ft. 1 in. (2·16 m.).
,, (bottom)	7 ft. (2·13 m.).
Gap	5 ft. (1·52 m.).
Length o.a.	31 ft. 2 in. (9·5 m.).
Height	10 ft. 8 in. (3·26 m.).



["FLIGHT" *Photograph*

GLOSTER "GAMECOCK II"

One Bristol "Jupiter" Engine

GENERAL

THE "Gamecock" is a high performance single-seater fighter fitted with Mark VI "Jupiter" air-cooled radial engine of 420 h.p. It forms part of the standard equipment of the Royal Air Force and is one of the fastest and most manœuvrable machines in the service.

In the handicap race for the Sassoon Cup in 1927, "Gamecock" machines won first, second and third places, and in the 1928 race also the fastest speed was attained by a "Gamecock" machine.

It has recently been adopted by the Finnish Air Service and is being manufactured under licence in that country.

The machine is supplied either in wood or metal or composite structure as required.

It is exceedingly clean and compact in design, giving exceptional manœuvrability. The lay-out of the equipment is a striking feature. Accessibility to the engine and all essential parts, by easily removable inspection doors, makes it a machine economical to maintain in service.

The wings consist of a high lift section upper wing and a medium lift section lower ring of reduced span and chord. The latest version differs from the prototype in that a centre section has been introduced between the upper wings and narrow chord ailerons substituted for the earlier type, giving a much more rigid construction.

Fuel tanks are situated in the upper wings giving a fool-proof gravity feed.

The undercarriage is of the oleo type damper action with rubber in compression.

The armament consists of two Vickers' guns in grooved recesses in the sides of the body firing through the propeller with synchronising gear and 1,200 rounds of ammunition. Provision is also made for fitting racks to carry 4-20 lb. (9 kg.) bombs.

Power Plant

Engine	420 h.p. "Jupiter" air-cooled radial Series VI, giving 520 h.p. at 1,870 r.p.m.
Fuel capacity	52 gallons (236 litres).
Oil capacity	5½ gallons (25 litres).
Position of fuel tanks ..	Two tanks mounted in top wings.

Main Dimensions

Wing span (top)	30 ft. 1 in. (9·200 m.).
Wing span (bottom)	26 ft. 4½ in. (8·050 m.).
Wing chord (top)	5 ft. 3 in. (1·600 m.).
Wing chord (bottom) ..	5 ft. 2½ in. (1·587 m.).
Gap	4 ft. 10 in. (1·473 m.).
Surface area	263 sq. ft. (24·4 m.²).

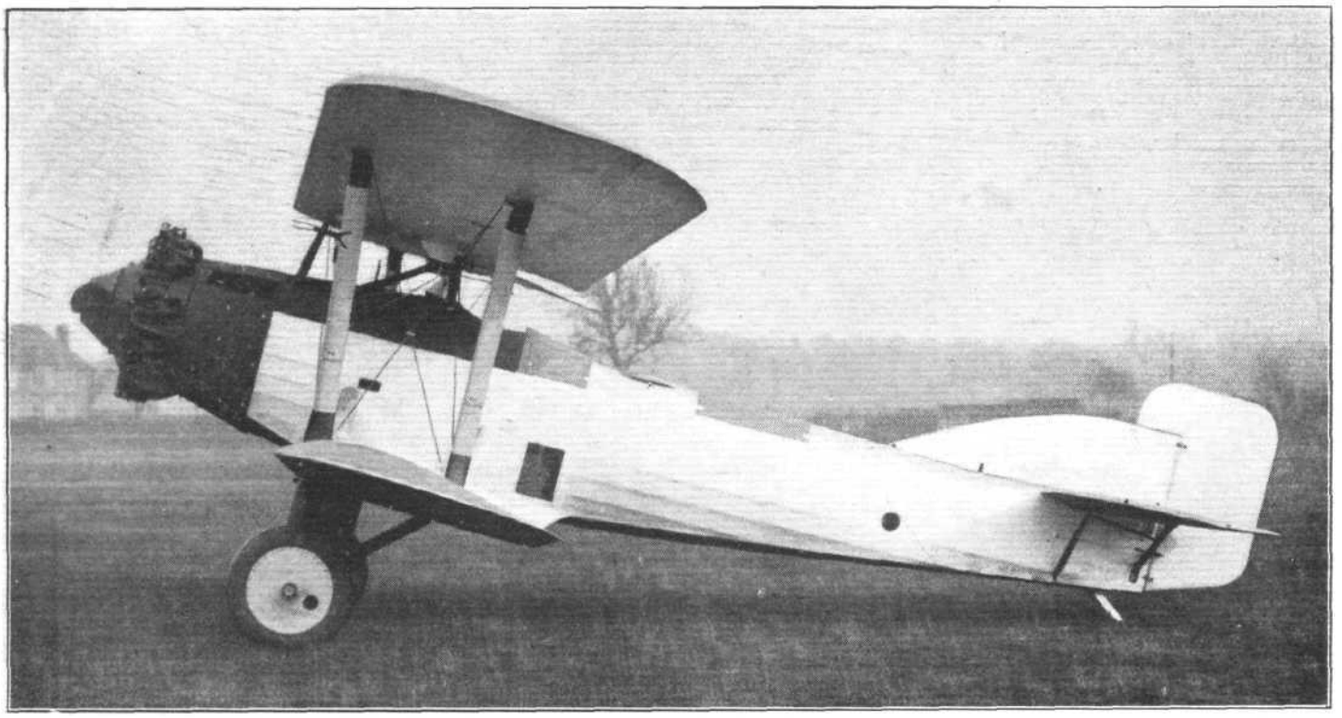
Weight and Loading

Total loaded weight ..	2,820 lbs. (1,280 kg.).
Load per sq. ft.	11 lbs./sq. ft. (53·6 kg./m.²).
Load per h.p.	5·56 lbs./h.p. (2·56 kg./C.V.)

Performance

Speed at 5,000 ft. (1,524 m.) ..	155 m.p.h. (249 kms./h.).
Speed at 10,000 ft. (3,050 m.)	152 m.p.h. (244 kms./h.).
Climb	11½ mins. to 15,000 ft. (4,570 m.).
Climb	20 mins. to 20,000 ft. (6,095 m.).
Ceiling absolute	25,500 ft. (7,780 m.).
Landing speed	49 m.p.h. (79 kms.).

Duration: 2½ hours at 15,000 ft. (4,570 m.) with full load.



["FLIGHT" *Photograph*

THE GLOSTER "GORING I"

One Bristol "Jupiter" Engine

GENERAL

THE Gloster "Goring" is a high-performance two-seater reconnaissance or bombing landplane or seaplane fitted with a 450-h.p. geared "Jupiter" engine. It can readily be adopted to fulfil several other purposes, *e.g.*, torpedo carrying, by changing the essential equipment.

It has very clean lines, excellent proportions, and a very good performance.

The construction is mainly of wood with steel fittings, but the all-metal version is under way.

The fuselage is very roomy, with ample space for fitting camera, wireless, bomb gear, and the various equipment necessary for long-distance navigation. The pilot's seat is adjustable in flight. The observer's seat can be shot into a concealed position by an easy release, leaving him full freedom for fighting.

The pilot has an excellent view forward and downward and also laterally for formation flying.

The gunner has an unobstructed downward view behind the trailing edge of the bottom wing. He has two stations, one above the fuselage with a scarff ring, and one at the bottom of the fuselage with bomb sights, etc.

The wings are of the single-bay type of unequal chord and span and slightly staggered. The wing section is of the high-lift Joukowski type modified. Fuel tanks are completely housed in the upper wings.

All controls are housed in the wings or fuselage, unexposed to accidental damage.

Armament consists of one Vickers gun on the top of the fuselage firing through the propeller and one Lewis gun on rotating mount in rear cockpit. Provision is made for bomb racks to carry 690 lbs. (314 kg.) bombs.

Floats are of Gloster design, and construction entirely of duralumin anodically treated.

Power Plant

Engine	450 h.p. Bristol "Jupiter" air-cooled radial, Series VIII, geared.
Fuel capacity	150 galls. (680 litres).
Oil capacity	14 galls. (63·5 litres).
Position of fuel tanks	Two 75-gall. tanks mounted in top wings.

Main Dimensions

Wing span (top)	42 ft. (12·8 m.).
Wing span (bottom)	33 ft. 4 in. (10·15 m.).
Wing chord (top)	7 ft. (2·13 m.).
Wing chord (bottom)	5 ft. 9 in. (1·75 m.).
Gap	5 ft. 10½ in. (1·79 m.).
Surface area	450 sq. ft. (41·8 m.²).

Weight and Loading as Landplane

Total loaded weight	5,600 lbs. (2,540 kg.).
Load per sq. ft.	12·43 lbs./sq. ft. (60·7 kg./m.²)
Load per h.p.	12·43 lbs./h.p. (5·9 kg./C.V.)

Performance as Landplane

Speed at 4,000 ft. (1,220 m.)	136 m.p.h. (219 km.).
Speed at 10,000 ft. (3,050 m.)	133 m.p.h. (214 km.).
Speed at 15,000 ft. (4,570 m.)	122 m.p.h. (196 km.).
Climb	4·5 mins. to 4,000 ft. (1,220 m.).
Climb	13·1 mins. to 10,000 ft. (3,050 m.).
Climb	27·5 mins. to 15,000 ft. (4,570 m.).
Ceiling service	16,500 ft. (5,030 m.).
Landing speed	51 m.p.h. (82 kms.).

Duration: 6½ hours at 15,000 ft. (4,570 m.) with full load.

THE GLOSTER "GAMBET"

"Jupiter" Engine

GENERAL

THE Gloster "Gambet" is a new single-seater deck-landing fighter fitted with a Series VI "Jupiter" air-cooled radial engine.

In a recent competition for a new machine of this class to be standardised in the Imperial Japanese Navy, this machine was the successful competitor and is now being constructed under licence in Japan.

The wing arrangement consists of a large upper wing of a thick section combined with a smaller and thinner section lower wing.

The wing structure is of normal timber construction with spruce spars, ribs and struts, swaged steel rod internal bracing and streamline wire external bracing.

The fuselage is built up of ash longerons, spruce struts and swaged rod bracing.

The engine is very neatly cowled in, giving the body a very clean entry.

The undercarriage is of the oleo type damper action with rubber in compression. Special streamline deck-landing hooks are fitted.

The pilot's seat is well up in the fuselage and the pilot has accordingly an excellent view downwards over the leading edge of the lower wing at an angle of 51° to the horizontal, and at as much as 12½° downwards straight ahead over the engine cowl.

Armament consists of a pair of synchronised Vickers' guns firing through the propeller from grooved recesses in the side of the body. Bomb racks are carried below the lower wings for 4-20 lb. (9 kg.) bombs.

Power Plant

Engine	420 h.p. "Jupiter" air-cooled Radial Series VI.
Fuel capacity	72 gallons (327 litres).
Oil capacity	7 gallons (31 litres).
Position of fuel tanks	Two tanks mounted in top wings.

Main Dimensions

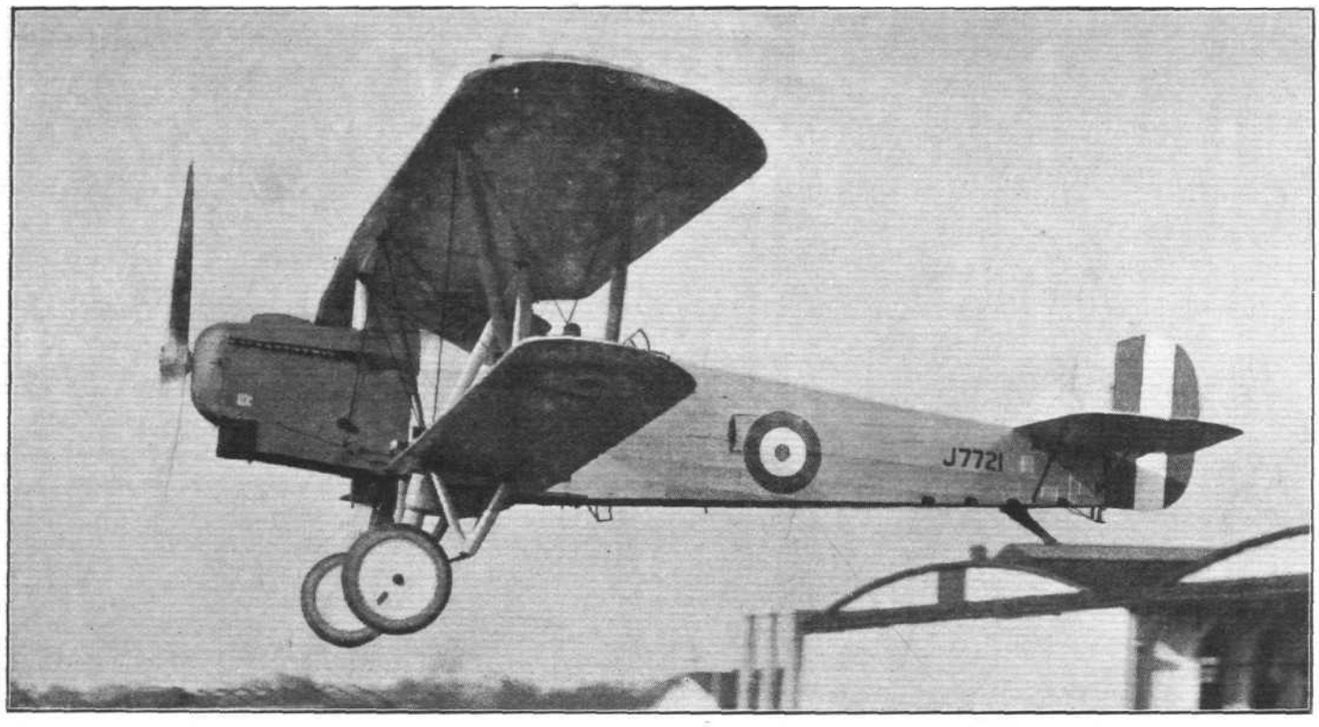
Wing span (top)	31 ft. 10 in. (9·702 m.).
Wing span (bottom)	26 ft. 0 in. (7·925 m.).
Wing chord (top)	5 ft. 6½ in. (1·688 m.).
Wing chord (bottom)	5 ft. 2½ in. (1·587 m.).
Gap	5 ft. 0 in. (1·524 m.).
Surface area	284 sq. ft. (26·383 m.²).

Weights and Loading

Total loaded weight	3,075 lbs. (1·397 kg.).
Load per sq. ft.	10·83 lbs./sq. ft. (52·954 kg/m²).
Load per horse-power	7·32 lbs./H.P. (3·28 kg./C.V.)

Performance

Speed at 5,000 ft. (1,524 m.)	152 m.p.h., 245 km.
,, 10,000 ft. (3,050 m.)	145 m.p.h., 233 km.
,, 15,000 ft. (4,570 m.)	138 m.p.h., 222 km.
Climb	3 mins. to 5,000 ft. (1,524 m.).
,,	7 mins. to 10,000 ft. (3,050 m.).
,,	11 mins. to 15,000 ft. (4, 70 m.).
Ceiling	23,000 ft. (7,000 m.).
Landing speed	49 m.p.h. (79 km.).
Duration	3¼ hours at 15,000 ft. (4,570 m.) with full load.



["FLIGHT" *Photograph*

THE HAWKER "HORSLEY"

Rolls-Royce "Condor" Engine

GENERAL

THE "Horsley" is a composite timber and metal machine, and is the standard day bomber of the Royal Air Force. The power unit is the Rolls-Royce "Condor," III, geared engine, and in addition to the bomb load, the machine is provided with two Vickers guns, one for the observer, and one firing forward. A prone bombing position is provided for the observer, giving an unrestricted field of vision. The "Horsley" possesses a remarkable degree of control and manœuvrability, and despite the size, can be handled with the ease of a scout machine.

Fuselage.—The front portion of the fuselage is of steel tubular construction, the remainder being of timber with wire bracing. The engine mounting is a triangulated structure of steel tube and is singularly free from vibration. The equipment is very accessible, and there is sufficient accommodation to allow the gunner to move freely from the firing to the prone bombing position. The pilot's seat is adjustable and provision has been made whereby an additional gun, firing downwards, can be quickly fitted if required.

Wings.—The wings are of the two-bay type, and a modified Göttingen section is utilised. The spars are of the box type of timber construction with steel wire bracing. The ailerons are fitted to the top planes only, and the interplane struts are of steel tubing. The centre section incorporates two petrol tanks of 115 gallons each (517 litres), and the design of the tanks is such as to allow the wire bracing to go straight through.

Tail Unit.—The tail unit is a composite structure of steel and timber. The rudder is of the balanced type, and the tail skid is of ash with an iron shoe, utilising rubber in compression for taking landing shocks.

Engine Installation.—The "Condor" III engine is mounted in a steel structure and the cowling is quickly detachable permitting of easy inspection. The radiator is of rectangular section with A. B. tubes. A "header" tank is fitted in front of the engine and there is adequate cooling area.

Undercarriage.—The undercarriage is of the split axle type and is of steel tubing throughout. The shock absorbing gear is on the oleo principle, and the design of the axles allows for the fitment of the largest size bombs.

Power Plant

Engine	Rolls-Royce "Condor" III.
Total horsepower	690 b.h.p.
Propeller drive	Geared
Fuel capacity	230 gallons (1,035 litres).
Position of fuel tanks	In top centre section.

Main Dimensions

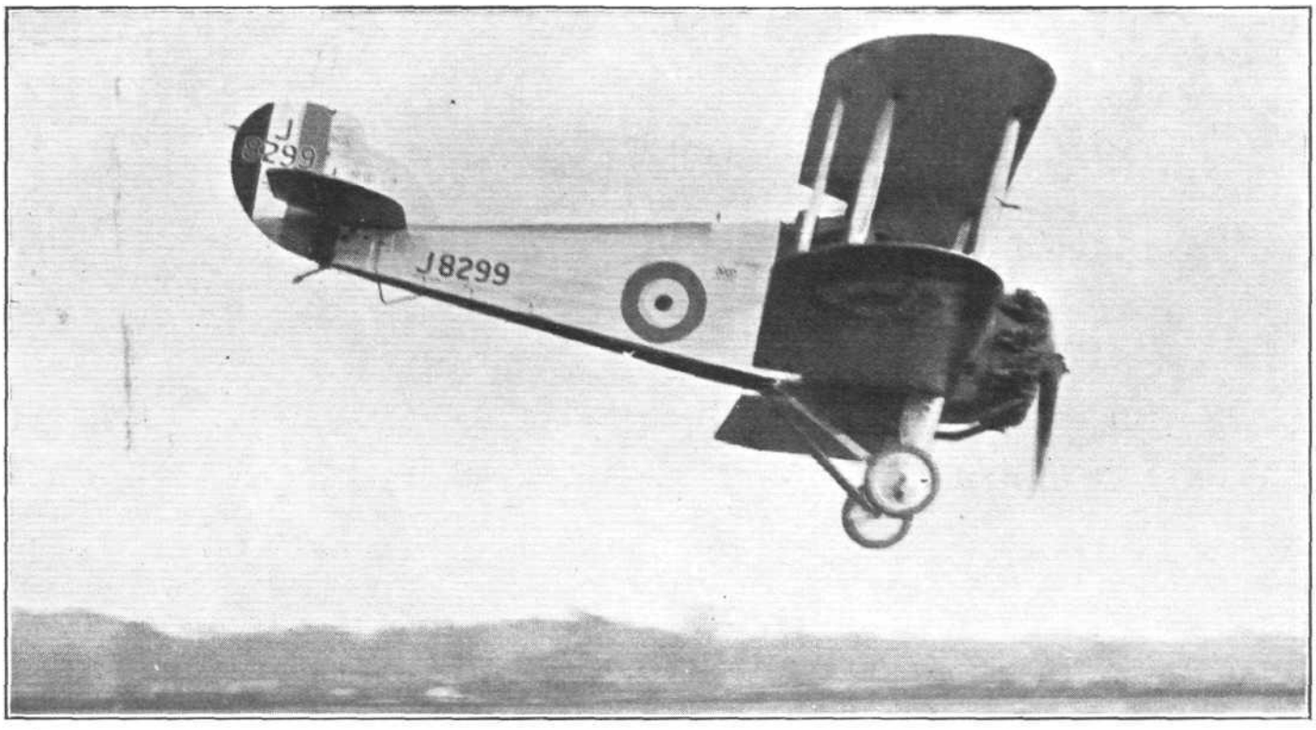
Wing span (top)	59 ft. 9 in. (18·2 m.).
Wing span (bottom)	49 ft. 10 in. (15·15 m.).
Wing chord (top)	8 ft. 6 in. (2·59 m.).
Wing chord (bottom)	5 ft. 2 in. (1·58 m.).
Wing area	692 sq. ft. (64·4 m.²).
Length, o.a.	38 ft. 3 in. (11·66 m.).
Height	13 ft. 8 in. (4·24 m.).

Weights and Loadings

Weight, empty	4,760 lbs. (2,160 kg.).
Service load	3,040 lbs. (1,378 kg.).
Total weight, loaded	7,800 lbs. (3,538 kg.).

Performance

Speed at ground level	126 m.p.h. (203 km./h.).
Speed at 10,000 ft. (3,050 m.)	120 m.p.h. (193 km./h.).
Speed at 15,000 ft. (4,570 m.)	114 m.p.h. (184 km./h.).
Service ceiling	20,000 ft. (6,100 m.).
Climb to 10,000 ft. (3,050 m.)	11·75 mins.
Climb to 15,000 ft. (4,570 m.)	24 mins.
Landing speed	50 m.p.h. (80·6 km./h.).
Range with full load	10 hours.



["FLIGHT" *Photograph*

THE HAWKER "WOODCOCK"

One Bristol "Jupiter" IV Engine

GENERAL

THE "Woodcock" is the standard single-seater night fighter of the Royal Air Force. The power unit is the Bristol "Jupiter," Mk. IV, radial air-cooled engine, and the armament consists of two Vickers guns, one on each side of the fuselage. This disposition prevents the flash from interfering with the pilot's vision at night.

The speed range renders the machine particularly suitable for night operations, and the cockpit is extremely comfortable.

Fuselage.—The fuselage is of timber construction utilising ash longerons and spruce struts braced with high tensile steel tie rods. Provision is made for wireless receiving and transmitting apparatus and oxygen supply. The instrument board is neatly arranged and provision is made for central lighting.

Wings.—The wings are of equal span and of timber construction. The spars are of solid spruce with widely spaced ribs braced with tie rods. The ailerons are operated by a differential gear from the bottom planes. A portion of the centre section is detachable to allow for the fitting of an extra tank of 18 gallons capacity, giving additional range if required.

Tail Unit.—The elevators, fin and rudder are constructed of steel tube, and the tail plane spar is of the same material. Adjustment by means of a hand-wheel is provided from the pilot's seat. The tail skid is of steel tube with a cast-iron shoe.

Engine Installation.—The "Jupiter" Mk. IV engine is installed on a simple steel tube structure and plate. The four main members are ball jointed at the fuselage end, fitting into a socket on the bulkhead, a spherical cover ensuring perfect alignment. The whole unit is quickly and easily detachable. The petrol tank is of tinned steel with 52 gallons (234 litres) capacity.

Undercarriage.—The undercarriage is of steel tubes with duralumin radius rods and incorporates the oleo principle. The track is of ample width and facilitates landing.

Power Unit

Engine	Bristol "Jupiter," Mk. IV.
Total horsepower	380 b.h.p.
Propeller drive	Direct.
Fuel capacity	52 gallons (234 litres).
Fuel tanks	In front portion of fuselage with additional capacity in top centre section.

Main Dimensions

Wing span	32 ft. 6 in. (9·9 m.).
Chord	6 ft. 0 in. (1·83 m.).
Length, o.a.	26 ft. 3 in. (8·0 m.).
Wing Area	346 sq. ft. (32·2 m.²).

Weights and Loadings

Weight, empty	2,080 lbs. (942 kg.).
Service load	960 lbs. (438 kg.).
Total weight	3,040 lbs. (1,380 kg.).

Performance

Speed at ground level	143 m.p.h. (230 km./h.).
Speed at 10,000 ft. (3,050 m.)	138 m.p.h. (222 km./h.).
Speed at 15,000 ft. (4,570 m.)	128 m.p.h. (206 km./h.).
Speed at 20,000 ft. (6,100 m.)	115 m.p.h. (185 km./h.).
Landing speed	47 m.p.h. (75 km./h.).
Climb to 10,000 ft. (3,050 m.)	8·8 mins.
Climb to 15,000 ft. (4,570 m.)	16·0 mins.
Climb to 20,000 ft. (6,100 m.)	27·9 mins.
Service ceiling	21,500 ft. (6,550 m.).
Absolute ceiling	23,500 ft. (7,170 m.).
Range with full load	3½ hours.

["FLIGHT" *Photograph*

THE PARNALL "IMP"

Armstrong-Siddeley "Genet" Engine

GENERAL

THE "Imp" was produced this year by George Parnall and Co. of Bristol, and is the latest design in the light aeroplane class. The engine is the Armstrong-Siddeley "Genet" radial, air-cooled, and the machine has an entire absence of wire bracing which gives a very clean appearance. Simplicity of design and a good view have been obtained by making the wings as cantilevers, wood-planked, and giving the top plane a pronounced sweep-back.

Fuselage.—This is of orthodox construction with a light skeleton of spruce, covered with ply-wood. It is, of course, flat-sided, and has a flat bottom, but a cambered deck fairing in the usual way. The top longerons are placed rather higher than in some machines, *i.e.*, the deck fairing forms a smaller percentage of the overall fuselage depth with the result that one has to step over the top longerons to get into the cockpits, which are roomy and comfortable. Dual control is fitted.

Wings.—The wing section employed—a modified R.A.F.31—is a fairly thick one with its centre line curved to a medium camber. The lower wing is in one length but the top wing is built in halves, hinged to a central *cabane* of streamline steel tube struts. A spruce veneer covers the wings and a fabric covering is used but not doped on. Both wings are easily detachable. Ailerons run the full length of the bottom plane and are not fitted to the top plane.

Engine Installation.—The "Genet" engine is mounted on tubes and separated from the cockpit by a fireproof bulkhead, whilst the petrol tank is placed in the deck fairing ahead of the front cockpit, where it gives sufficient head for gravity feed to the engine. Thus the necessity for a centre section tank is avoided, which, in any case, would be difficult to install with the existing wing design.

Undercarriage.—This is the usual V-type with oleo and spiral spring "legs." The travel is about 5 in. and the track is wide.

Power Plant

Engine	Armstrong-Siddeley "Genet"
Total horse-power	87
Propeller drive	Direct.
Fuel capacity	13 gallons (58·5 litres).
Placing of fuel tank	In fuselage.

Main Dimensions

Wing span (top)	25 ft. 6 in. (7·7 m.).
Wing span (bottom)	21 ft. 6 in. (6·5 m.).
Wing chord (top)	4 ft. 0 in. (1·2 m.).
Wing chord (bottom)	4 ft. 0 in. (1·2 m.).
Wing area	176 sq. ft. (15·8 m.²).
Length o.a.	21 ft. 2 in. (6·4 m.).

Weights and Loading

Weight empty	850 lbs. (386 kg.).
Load carried	470 lbs. (214 kg.).
Total loaded weight	1,320 lbs. (600 kg.).
Wing loading	7·5 lbs./sq. ft. (37 kg./m.²).
Power loading	15·1 lbs./h.p. (6·8 kg./CV.).

No performance figures available.

["FLIGHT" *Photograph*

THE HANDLEY PAGE "HARROW"

A General Purpose Torpedo Aircraft

GENERAL

THE aircraft is of the single-engined tractor biplane type, having two planes of equal span. The centre section is of large proportions, providing a rigid structure, and facilitates folding of the main planes.

Construction.—Unless otherwise ordered, the aircraft is of composite wood and metal construction, the highest-grade materials being used, as approved for the British Air Ministry.

Fuselage.—The front portion of the fuselage from engine to pilot's seat is of steel tubular construction, with tie-rod bracing, while the rear portion of the fuselage has spruce longerons and struts with wire bracing. The fuselage is fabric covered, no use being made of three-ply.

Wings.—The wings and tail unit have spruce box spars and ribs, with internal wire bracing, the wing being fabric covered. In order to facilitate and minimise the amount of housing space required, the aircraft is provided with wings which fold backwards along the fuselage, thus reducing the total span to 5·48 m. Two types of automatic slot are fitted—one providing automatic lateral stability and control, and the other giving a slow landing speed. The slots, being mounted on ball bearings, require no maintenance other than casual lubrication at infrequent intervals.

Power Unit.—Although the aircraft shown above is fitted with a Napier Lion engine, the aircraft is designed to take the Bristol Jupiter engines, of Series IV, VI, or VIII. The engine mounting is readily demountable and most accessible, should it be desired to change from a water-cooled to an air-cooled type of engine. All carburettor air intakes are arranged to come out at the side of the engine nacelle, so that when used as a seaplane, no seawater enters the carburettor. Hand-starting is provided, and is accessible, when used both as a land or float seaplane.

Undercarriage.—The undercarriage is of the oleo type, with rubber in compression. 900 mm. by 200 mm. Palmer wheels and tyres are fitted when used as a land-plane. The tail skid is of the non-steerable type, having rubber in compression, to absorb shock. When used as a seaplane, either a rigid or non-rigid float undercarriage is provided, according to the conditions under which the machine will be operating.

Power Plant

Engine	1 Napier Lion XA.
Total horse-power	550.
Propeller drive	Geared, 0·53 : 1.
Fuel capacity	156 gall. (710 litres).
Placing of fuel tanks	Fuselage and top wing.

Main Dimensions

Wing span (top)	46 ft. (14 m.).
Wing span (bottom)	46 ft. (14 m.).
Wing chord (top)	6 ft. 10 in. (2·08 m.).
Wing chord (bottom)	6 ft. 10 in. (2·08 m.).
Wing area	587 sq. ft. (54·5 m.²).
Length o.a.	33 ft. 10 in. (10·32 m.).

Weight and Loading

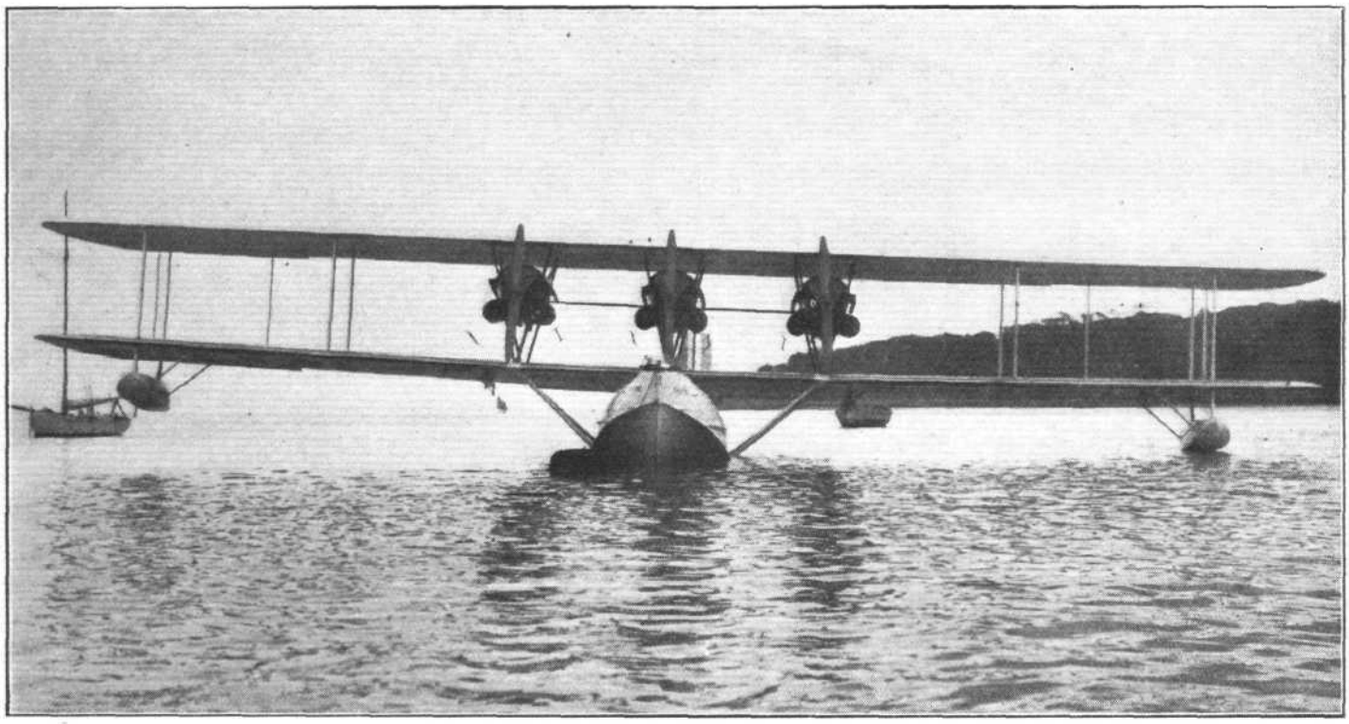
Weight empty	4,090 lbs. (1,860 kg.).
Load carried	3,183 lbs. (1,445 kg.).
Total loaded weight	7,273 lbs. (3,300 kg.).
Wing loading	12·35 lbs. per sq. ft. (60·2 kg. m.²).
Power loading	13·2 lbs. per h.p. (5·85 kg./C.V).

Performance

Speed at 5,000 ft. (1,524 m.)	131 m.p.h. (211 km./hr.).
Speed at 10,000 ft. (3,050 m.)	126·5 m.p.h. (205 km./hr.).
Speed at 15,000 ft. (4,570 m.)	92 m.p.h. (108 km./hr.).
Landing speed	46 m.p.h. (74 km./hr.).
Climb to 10,000 ft. (3,050 m.)	21·6 min.
Service ceiling	13,300 ft. (4,050 m.).
Absolute ceiling	15,300 ft. (4,670 m.).
Range cruising	300 miles (483 km.).

Everling Quantities

High-speed figure	15·6.
Distance figure	5·1.
Altitude figure	5·5.



THE SAUNDERS "VALKYRIE"

Three Rolls-Royce "Condor" Engines

GENERAL

S. E. SAUNDERS, LTD., of East Cowes, Isle of Wight, have specialised for many years in flying-boats, the "Valkyrie" being one of their latest products.

The machine is fitted with three Rolls-Royce "Condor" IIIA engines, and is designed for the duties of fleet reconnaissance.

Machine guns are carried in the nose, and in staggered scarff rings in the tail, and there are fittings to carry bombs under the wings.

The machine is mainly constructed of wood, but metal fittings are made from stainless steel.

Hull.—The hull is built of Saunders' patent copper-sewn laminated planking on the elastic principle, and is fitted out with bunks and living quarters for a crew of five.

Wings.—The wings are in the form of an equal-span biplane, large areas of which are covered with planking for access to engines, controls, and other parts.

Tail.—The construction of the tail is on similar lines to that of the wings, tail-adjusting mechanism being provided.

Controls.—Control is provided for two pilots, and all the surfaces are balanced with continuous leading edge balance. The rudder control is by Servo from a small Servo rudder pivotting on out-riggers behind the main rudder.

Engine Installation.—The engines are installed in three identical all-metal mountings placed between the wings, and are fully faired with duralumin fairing. Access to these mountings is by means of the aforementioned platforms on the wings. Three oil tanks are provided in the fairing behind the respective engines.

The whole of the petrol is carried in two large petrol tanks, mounted in the top plane of 460 gallons each, giving a gravity feed to the engines.

Power Plant

Engines	3 Rolls-Royce "Condor" IIIA
Total horse-power	2000 b.h.p.
Propeller drive	geared.
Fuel capacity	920 gallons (4,140 litres).
Placing of fuel tanks	in top wing.
Oil, total capacity	55 gallons (248 litres).

Main Dimensions

Wing span top	97 ft. 0 in. (29·6 m.).
Wing span bottom	97 ft. 0 in. (29·6 m.).
Wing chord top	10 ft. 6 in. (3·2 m.).
Wing chord bottom	10 ft. 6 in. (3·2 m.).
Area of wings	1,968 sq. ft. (183 m.²).
Length overall	66 ft. 0 in. (20·1 m.).

Weight and Loading

Weight empty	17,900 lbs. (8,140 kg.).
Load weight	8,700 lbs. (3,960 kg.).
Total loaded weight	26,600 lbs. (12,100 kg.).
Wing loading	13·5 lbs./sq. ft. (66·2 kg./m.²).
Power loading	13·3 lbs./h.p. (6·05 kg./CV).

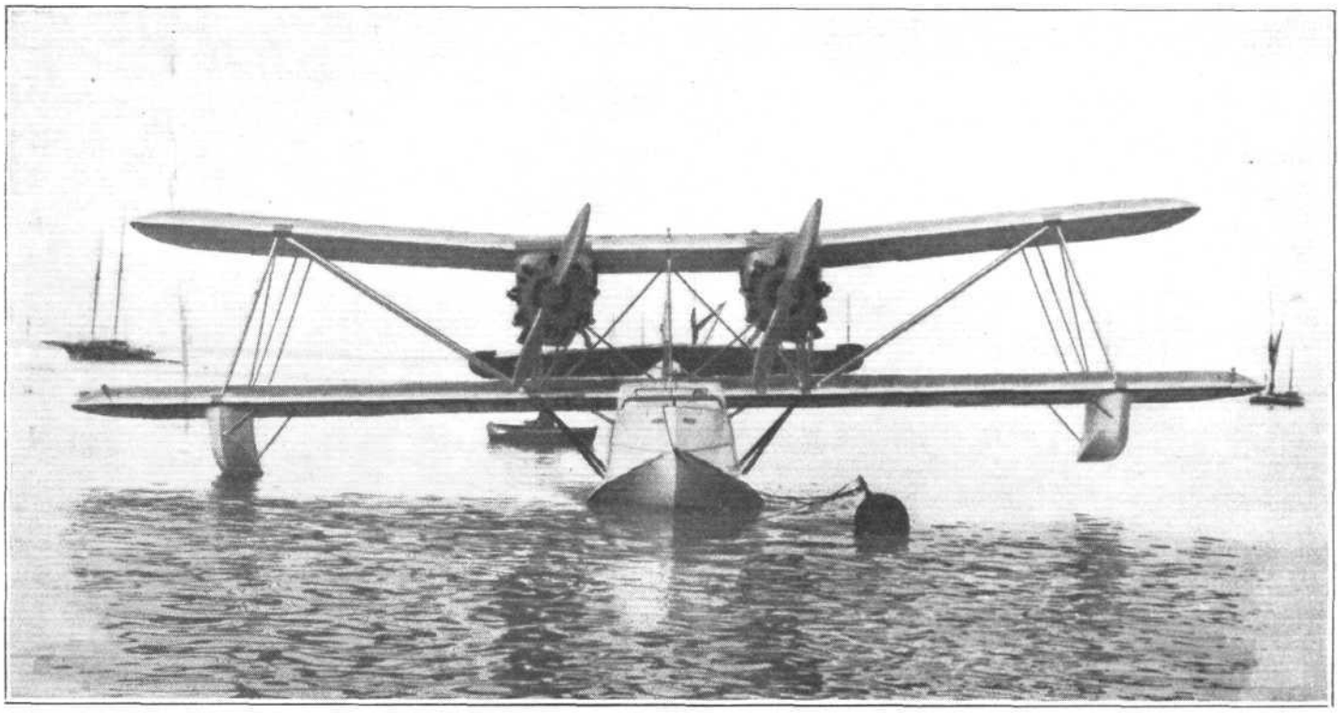
Performance

Speed at sea level	125 m.p.h. (201 km./hr.)
Landing speed	60 m.p.h. (96·6 km./hr.).
Absolute ceiling	15,000 ft. (4,570 m.).

Everling Quantities

High-speed figure	13·5.
Distance figure	4·5.
Altitude figure	6·3.

The distance figure of 4·5 refers to top speed, and so is not an optimum value.



THE SAUNDERS "MEDINA"

Two Bristol "Jupiter" Engines

GENERAL

THIS machine is designed and built by S. E. Saunders, Ltd., of East Cowes, Isle of Wight, and is a passenger-carrying flying-boat, carrying ten passengers in a cabin placed in the centre part of the hull. The machine carries a crew of two, and is fitted out with Marconi wireless. Lavatory and luggage compartments are also included in the hull.

Hull.—The hull is constructed of Saunders' patent sewn plywood, and is fitted from the bows aft in the following manner: In the nose is a cockpit with hatch for the purpose of operating the boat, picking up moorings, etc. Immediately after this is the wireless compartment, and side-by-side seating for the pilot and crew.

Behind the pilot's cockpit is the forward bulkhead of the cabin; in the latter are placed seats for ten passengers. Aft of the cabin on the starboard side there is a lavatory, and on the port side a companion ladder. Aft again of this is a luggage compartment.

Wings.—The wings are of deep section, and are constructed of wood with large areas of plywood covering. The wings are of unequal span, the bottom wings being of greater span than the top. No bracing wires are used in this machine, the whole of the bracing being done by rigid tubular members.

Controls.—The controls are actuated by tubular rods, the rudder and elevator being balanced by horn balances.

Engine Installation.—The two Jupiter VI engine mountings are built on to and slung from the top wings; the after part of the fairing houses the fuel tanks, and the feed to the carburettors is by gravity.

Wing Tip Floats.—The wing tip floats are bolted directly on to the wings, and are constructed on a similar principle to the hull.

Power Plant

Engines	2 "Jupiter VI."
Total horse-power	900 b.h.p.
Propeller drive	Direct.
Fuel capacity	200 gallons (900 litres).

Main Dimensions

Wing span (top)	52 ft. 0 in. (15·85 m.).
Wing span (bottom)	58 ft. 0 in. (17·68 m.).
Wing chord (top)	9 ft. 4 in. (2·84 m.).
Wing chord (bottom)	9 ft. 4 in. (2·84 m.).
Wing area	1,000 sq. ft. (93 m.²).
Length overall	49 ft. 0 in. (14·95 m.).

Weights and Loading

Weight, empty	8,060 lb. (3,660 kg.).
Load carried	3,500 lbs. (1,590 kg.).
Total loaded weight	11,560 lbs. (5,250 kg.).
Wing loading	11·5 lbs./sq. ft. (56·5 kg./m.²).
Power loading	12·85 lb./h.p. (5·84 kg./CV.).

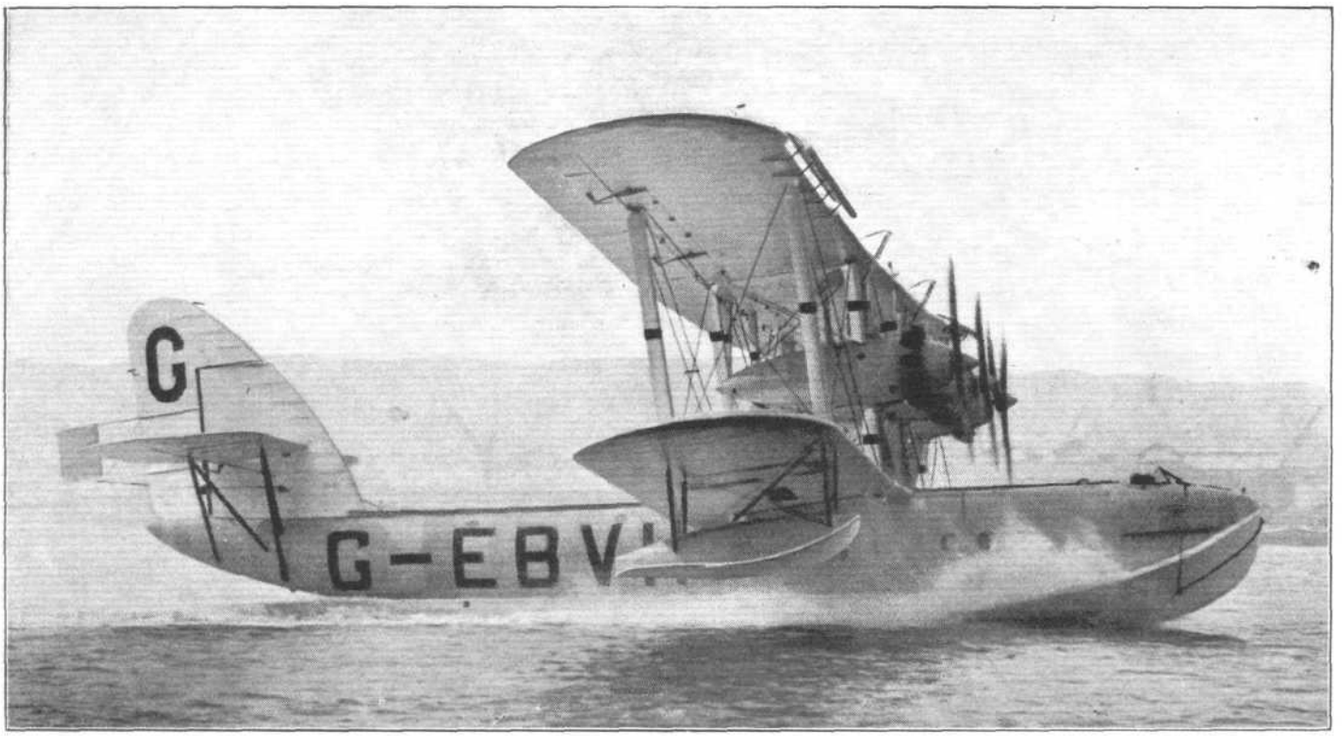
Performance

Speed at sea level	115 m.p.h. (185 km./h.).
Cruising speed	90 m.p.h. (145 km./h.).
Duration at 90 m.p.h.	4 hrs.

Everling Quantities

High-speed figure	12.
Distance figure	4.

The "distance figure" of 4 refers to top speed, and so is not an optimum value.



["FLIGHT" *Photograph*

THE SHORT "CALCUTTA"

Three Bristol "Jupiter IX" Engines

GENERAL

THE first British all-metal commercial flying-boat to be put in service is the "Calcutta," designed and built by Short Brothers, of Rochester, who have devoted a great deal of work and research to the development of all-metal, and more particularly to all-Duralumin, construction during the last five or six years. The "Calcutta" is a good deal like the Short "Singapore" on which Sir Alan Cobham recently completed his flight around Africa, but with passenger cabin accommodation and three engines instead of two.

The Boat Hull.—Built entirely of Duralumin, the hull is of the two-step type, but with the rear step faired in so as to reduce resistance. The planing bottom has a fairly pronounced Vee so as to reduce shock on alighting. The construction is the special type developed by Short Brothers, in which the outer plating is in small panels attached to transverse formers by riveting. The fore-and-aft members or stringers do not run through, but are interrupted at the transverse formers and bulkheads.

The cabin has seating accommodation for 15 passengers, and aft of the cabin is on one side the lavatory with folding wash basin and on the other a buffet and an oil cooker for the preparation of meals during flight. Ahead of the cabin is the pilot's cockpit, with two seats side by side. The wireless compartment is comfortable, with seat, table, shelves, etc., and the machine is equipped for sending and receiving wireless messages over considerable distances.

Wings.—Except for the fabric covering, the wings are of all-metal construction, Duralumin being the material chiefly used, with a few steel fittings at highly-stressed points. The spars are built up of corrugated webs and flanges of Duralumin, laminated according to the local strength required at any point, and the ribs are lattices of Duralumin tube. Ailerons are fitted to top plane only. Wing tip floats, also of Duralumin construction, give lateral stability on the water.

Tail.—Duralumin construction with fabric covering. The rudder has a horn balance and a small Servo rudder as well, making the machine very light on the controls.

Engine Installation.—The three "Jupiter" engines are mounted in the gap between wings. The petrol tanks are in the top plane, and there is no petrol in the hull.

Power Plant

Engines	3 Bristol "Jupiters"
Total horse-power	970 b.h.p.
Propeller drive	Geared 5 : 1.
Fuel capacity	480 gallons (2,160 litres).
No. and placing of fuel tanks	2, in top plane.
Fuel supply to engines	Direct gravity feed.

Main Dimensions

Wing span (top)	93 ft. 0 in. (28·36 m.).
Wing span (bottom)	76 ft. 6 in. (23·15 m.).
Wing chord (top)	11 ft. 6 in. (3·51 m.).
Wing chord (bottom)	11 ft. 6 in. (3·51 m.).
Total wing area	1,825 sq. ft. (170 m.²).
Length o.a.	64 ft. 9 in. (19·75 m.).

Weights and Loading

Weight empty	12,804 lb. (5,820 kg.).
Load available	7,696 lb. (3,500 kg.).
Total loaded weight	20,500 lb. (9,320 kg.).
Wing loading	11·05 lb./sq. ft. (54 kg./m.²).
Power loading (full power)	12·8 lb./h.p. (5·83 kg./CV).
"Wing power"	0·863 h.p./sq. ft. (9·26CV/m.²).

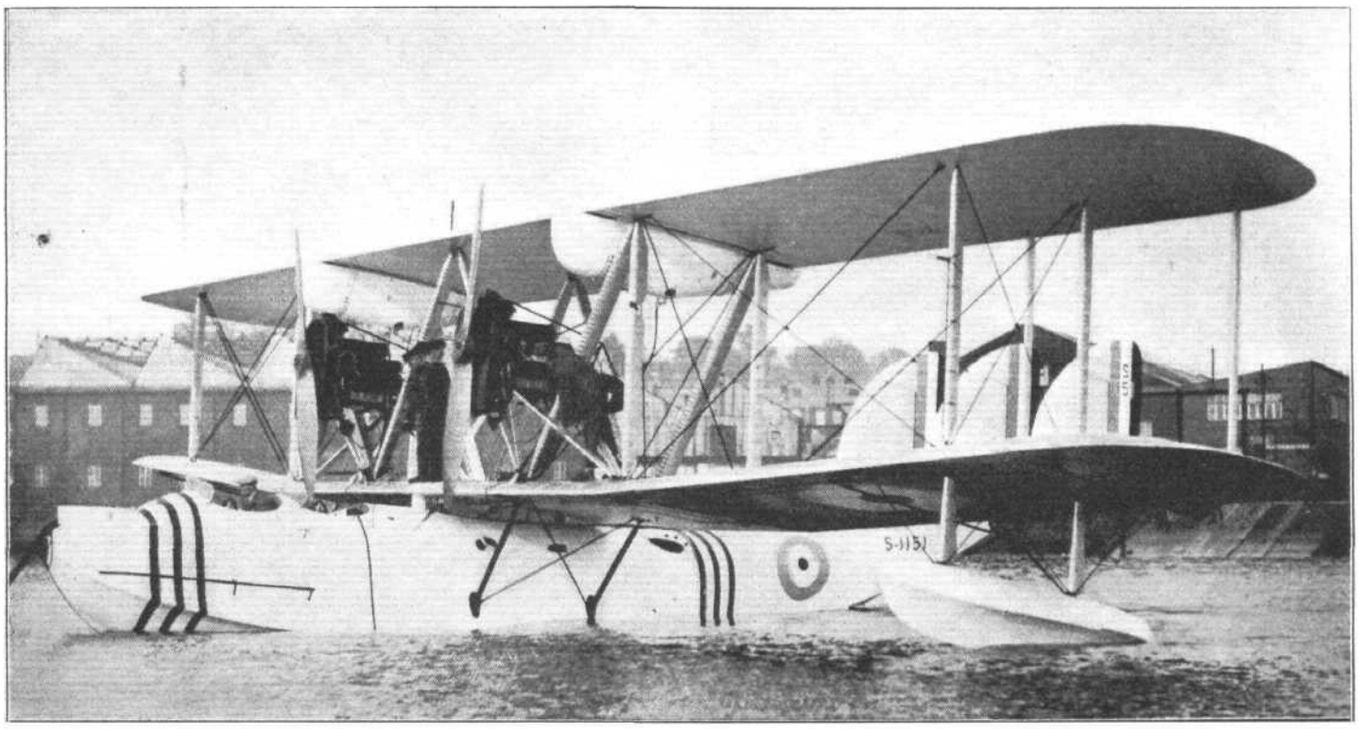
Performance

Max. speed at sea level	126 m.p.h. (203 km./h.).
Cruising speed	100 m.p.h. (160 km./h.).
Landing speed	57·5 m.p.h. (92 km./h.).
Rate of climb at ground level	750 ft./min. (5 m./sec.).
Service ceiling	13,000 ft. (4,120 m.).
Endurance (with normal pay load)	5·5 hours.
Range (with normal pay load)	500 miles (805 km.).
Endurance (with full tanks)	8·2 hours.
Range (with full tanks)	760 miles (1,215 km.).

"Everling Quantities"

High-speed figure	14.
Distance figure	4·2.
Altitude figure	4·3.

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS



THE SUPERMARINE "SOUTHAMPTON"

Two Napier "Lion" Engines

GENERAL

ONE of the most successful British flying-boats of modern times is the "Southampton" designed and built by the Supermarine Aviation Works, Ltd., of Southampton. A flight of these machines, manned by British Royal Air Force personnel, is now on a protracted cruise to Australia. The machine is produced both with wooden hull and with metal hull. The latter is considerably lighter than the former, and has the additional advantage of absence of water soakage.

The normal "Southampton" is designed for a total useful load of 5,290 lb. (2,400 kg.), the composition of which can be varied within the total according to whether the machine is intended for bombing or for reconnaissance. If it is desired to use the machine for long-distance flights, carrying but a crew of two or three, with the rest of the disposable load in the form of fuel, a very great range is provided.

The Boat Hull.—The metal hull is built entirely of Duralumin, with the exception of fittings made of stainless steel. All Duralumin parts are given the anodic treatment to enable them to resist corrosion. The hull is of the two-step type, and is so located and proportioned as to prevent "porpoising." Lateral stability on the water is by Duralumin wing-tip floats. When the machine is used for bombing, a crew of four can be carried, while for reconnaissance this may be increased to five. The hull construction is such that there are no obstructions inside, and as the tanks are mounted under the top plane, the whole hull is clear for stowing the load carried, moving about, &c.

Wings.—Of biplane arrangement, the wings are of equal span and chord, with the gap between them equal to the wing chord. The centre section of the wing structure is built up in the form of a Warren girder, an arrangement which lends itself admirably to the installation of the power units.

Engine Installation.—The engine mountings are separate units carried on the lower centre-section plane. They can be removed without interfering with the main wing structure. The radiators and oil tanks are removed with the engine units, and all engine instruments are mounted on the engine bearers. The petrol system is by gravity feed only, the two petrol tanks being hung under the top centre-section.

Power Plant

Engines	2 Napier "Lion V."
Total power (normal)	940 b.h.p. at 2,000 r.p.m.
Total power (maximum)	1,004 b.h.p. at 2,200 r.p.m.
Propeller drive	Reduction gearing.
Fuel capacity (bombing)	300 gallons (1,350 litres).
,, (reconnaissance)	400 gallons (1,800 litres).
Placing of fuel tanks	Under top plane.
Fuel supply	Direct gravity feed.

Main Dimensions

Wing span (top)	75 ft. (22·85 m.).
,, (bottom)	75 ft. (22·85 m.)
Wing chord (top)	10 ft. (3·05 m.).
,, (bottom)	10 ft. (3·05 m.)
Total wing area	1,426 sq. ft. (132·5 m.²).
Length-o.a.	49 ft. 8 in. (15·16 m.)

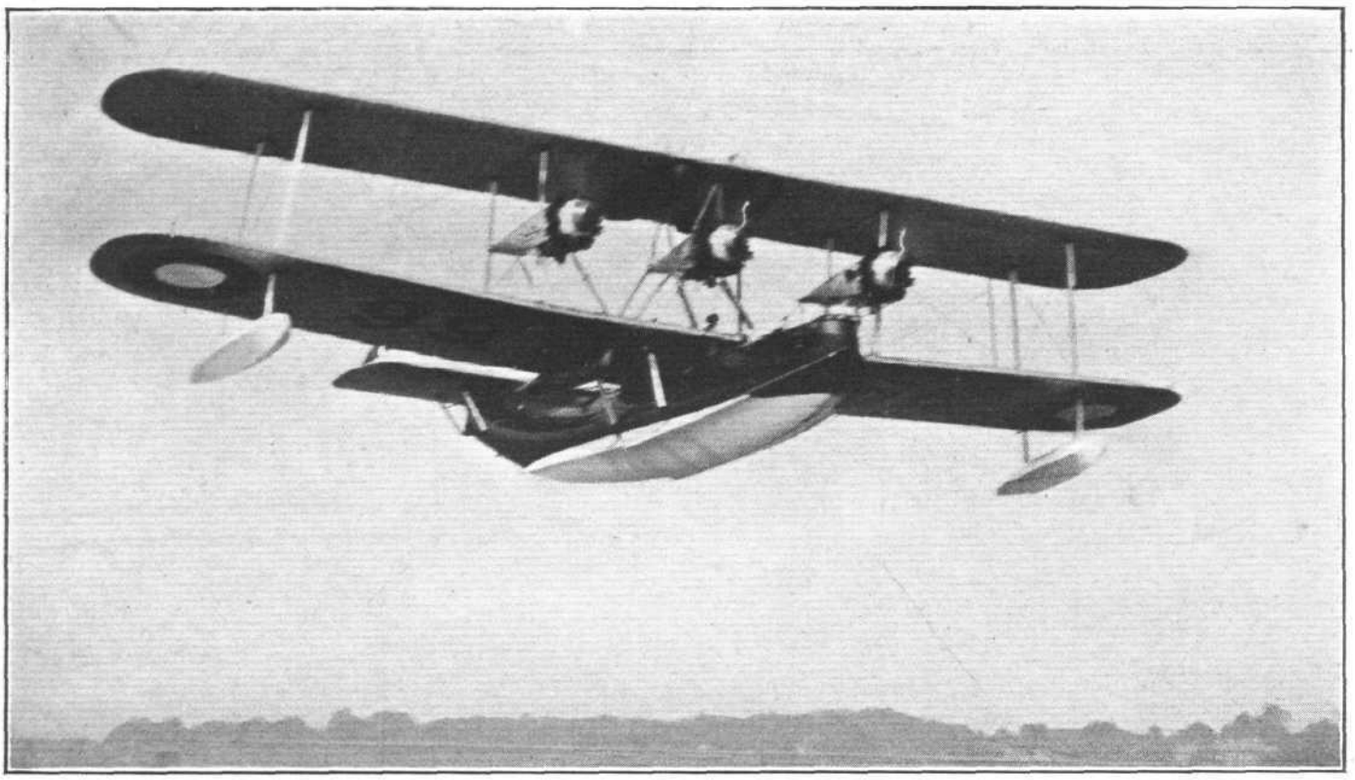
Weights and Loading

Weight empty	9,010 lbs. (4,100 kg.).
Load carried (including fuel)	5,290 lbs. (2,400 kg.).
Total loaded weight	14,300 lbs. (6,500 kg.).
Wing loading	10 lbs./sq. ft. (49 kg./m.²).
Power loading (normal)	15·2 lbs./h.p. (6·9 kg./CV.).
,, ,, (maximum power)	14·25 lbs./h.p. (6·46 kg./CV).

Performance

Maximum speed at sea level	108 m.p.h. (174 km./h.).
Cruising speed	85 m.p.h. (137 km./h.).
Minimum speed	56 m.p.h. (90 km./h.).
Rate of climb (sea level)	610 ft./mins. (3·1 m./sec.).
Ceiling	14,000 ft. (4,270 m.)
Range at cruising speed (400 gallons)	680 miles (1,100 km.).

Note.—Above performance figures relate to machine with wooden hull. When fitted with metal hull the empty weight is decreased by 450 lbs. (205 kg.), increasing the useful load by that amount; or alternatively the range can be increased by 90 miles (145 km.) to 770 miles (1,245 km.)



THE SUPERMARINE "SOLENT"

Three Armstrong-Siddeley "Jaguar" Engines

GENERAL

To the Supermarine Aviation Works, Woolston, Southampton, belongs the credit of being the first British firm to produce a three-engined torpedo-carrying flying-boat capable of carrying a 1,500-lb. (682-kg.) torpedo slung on each side of the hull. The machine, which has been christened the "Solent," has recently completed its tests, and no difficulty was experienced in dropping the torpedoes one at a time, the aileron control being sufficiently powerful to overcome the weight of one torpedo mounted some way out from the centre.

The Boat Hull.—Of all-wood construction, the hull of the "Solent" is of the type which has become known as a "Linton Hope," *i.e.* with a main structure approximately circular in cross-section, and the steps and chines built-on. As in all modern British flying boats, there are two steps, and the planing bottom has the form of a rounded Vee. The internal framework consists of light frames and timbers, with numerous light stringers running fore and aft. The planking is laid on in a fore-and-aft direction, and is of mahogany.

The two torpedoes, supported under the lower centre section, are provided with gear for winding, so that they can be wheeled under the wings while the machine is on a slipway, or taken out in a launch and hauled up on to the racks without the use of any extraneous equipment.

When carrying the two torpedoes the "Solent" carries fuel for 3½ hours' flight, but by leaving off the torpedoes and completely filling the tanks the endurance is increased to 11·2 hours and the range to 950 miles (1,530 kms.).

Wings.—Arranged as an equal-span, equal-chord biplane, with a back-sweep of several degrees. Of wood construction, fabric covered, with the normal two-spar arrangement. Ailerons fitted to both top and bottom planes. Lateral stability on the water is provided by two wing-tip floats.

Tail.—Large monoplane horizontal tail plane, with smaller one between rudders, used for trimming. There are three fins and rudders, with horn balances.

Engine Installation.—The three "Jaguar" engines are mounted in the gap, and are carefully streamlined. The two large petrol tanks are in the top plane, slightly off the centre line, and provide direct gravity feed, so that there is no petrol in the hull.

Power Plant

Engines	3 Armstrong-Siddeley "Jaguar."
Total horse-power	1,265 b.h.p.
Propeller drive	Direct.
Fuel capacity (normal tankage)	210 galls. (954 litres).
Fuel capacity (total tankage)	560 galls. (2,544 litres).
Number and placing of fuel tanks	Two, in top plane.
Fuel supply to engines	Direct gravity feed.

Main Dimensions

Wing span (top)	75 ft. (22·8 m.).
Wing span (bottom)	75 ft. (22·8 m.).
Wing chord (top)	11 ft. (3·36 m.).
Wing chord (bottom)	11 ft. (3·36 m.).
Wing gap	10 ft. 6 in. (3·20 m.).
Total wing area	1,576 sq. ft. (146·6 m.²).
Length overall	50 ft. 2 in. (15·3 m.).
Height	19 ft. (5·80 m.).

W ights and Loading

Weight empty	9,840 lb. (4,469 kg.).
Disposable load	6,460 lb. (2,931 kg.).
Total loaded weight	16,300 lb. (7,400 kg.).
Power loading	12·9 lb./h.p. (5·85 kg./CV).
Wing loading	10·3 lb./sq. ft. (50·5 kg./m.²).
"Wing power"	0·83 h.p./sq. ft. (8·63 CV/m.²).

Performance

Maximum speed at sea level	111 m.p.h. (178·5 km./h.).
Cruising speed	90 m.p.h. (145 km./h.).
Landing speed	54 m.p.h. (87 km./h.).
Climb to 5,000 ft. (1,525 m.)	10·25 mins.
Service ceiling	11,000 ft. (3,360 m.).
Endurance at cruising speed (normal tankage)	3·5 hrs.
Endurance at cruising speed (full tankage)	11·2 hrs.
Range with total tankage (no torpedoes)	950 miles (1,530 km.)

THE VICKERS "VIVID"

One Napier "Lion XI" Engine

GENERAL

THE "Vivid," a two-seater reconnaissance machine designed and built by Vickers, Ltd., at Weybridge, is powered by one Napier "Lion XI" water-cooled engine and provided with interchangeable land and float undercarriages. The pilot's cockpit is fitted with two fixed Vicker's belt-feed guns firing forward through the airscrew disc. The observer, immediately to the rear, is armed with a Vicker's drum feed gun mounted on a Scarff ring.

In addition to the above, the aircraft is designed to carry 4 × 250 lb. bombs slung under the lower plane, a prone sighting position for the observer being arranged under the pilot's seat.

Fuselage.—Constructed throughout of mild steel tubes and braced with tie rods. Machined steel fittings occur at the points of attachment of engine mounting, chassis, wings, etc. while all other angle joints are of wrapped steel plate with sockets to receive vertical and cross members.

Wings.—The arrangement is that of a staggered, unequal span biplane and the structure throughout is of metal with fabric covering. The dural spars consist of double T-section extruded flanges riveted to joggled plate webs; drag loads are taken by special compression ribs and tie rod bracing, while profile ribs are of dural tube. Statically balanced Frise type ailerons are fitted to both upper and lower wings.

Tail.—Structure and covering is similar to main planes, while shrouded horn balance is fitted to elevators and rudder.

Engine Installation.—The engine is in the nose of the machine, mounted on bearers supported on a steel tubular framework which also carries an underslung nose radiator, the whole being cowled in to give a good entry shape. The two main petrol tanks form part of the upper wing while a removable auxiliary tank is located in the fuselage.

Undercarriages.—The two-wheeled land chassis is of the split-axle type to give good ground clearance and unobstructed bomb sighting view, while the seaplane unit has two dural floats mounted on a cross-braced structure, both undercarriages incorporating Vickers' patent oleopneumatic shock absorbers.

Power Plant

Engine	1 Napier "Lion XI."
Horse-power	590 at 2,600 r.p.m.
Propeller drive	Geared 0·532 : 1.
Fuel capacity main	124 gallons (564 litres).
,, auxiliary	85 gallons (386 litres).

Main Dimensions (as Landplane)

Wing span (upper)	45 ft. 1 in. (13·720 m.).
,, (lower)	39 ft. 7 in. (12·065 m.).
Wing chord (upper)	8 ft. 3 in. (2·515 m.).
,, (lower)	7 ft. 0 in. (2·135 m.).
Wing area	593 sq. ft. (55·095 sq. m.).
Length o.a.	34 ft. 5 in. (10·490 m.).

Weight and Loading (as Landplane)

Weight empty (with all water)	3,560 lbs. (1,613 kg.).
Load carried	1,990 lbs. (905 kg.).
Total loaded weight	5,550 lbs. (2,518 kg.).
Wing loading	9·35 lbs./sq. ft. (45·75 kg./sq. m.).
Power loading (on 590 h.p.)	9·4 lbs. (4·27 kg.).

Performance (as Landplane)

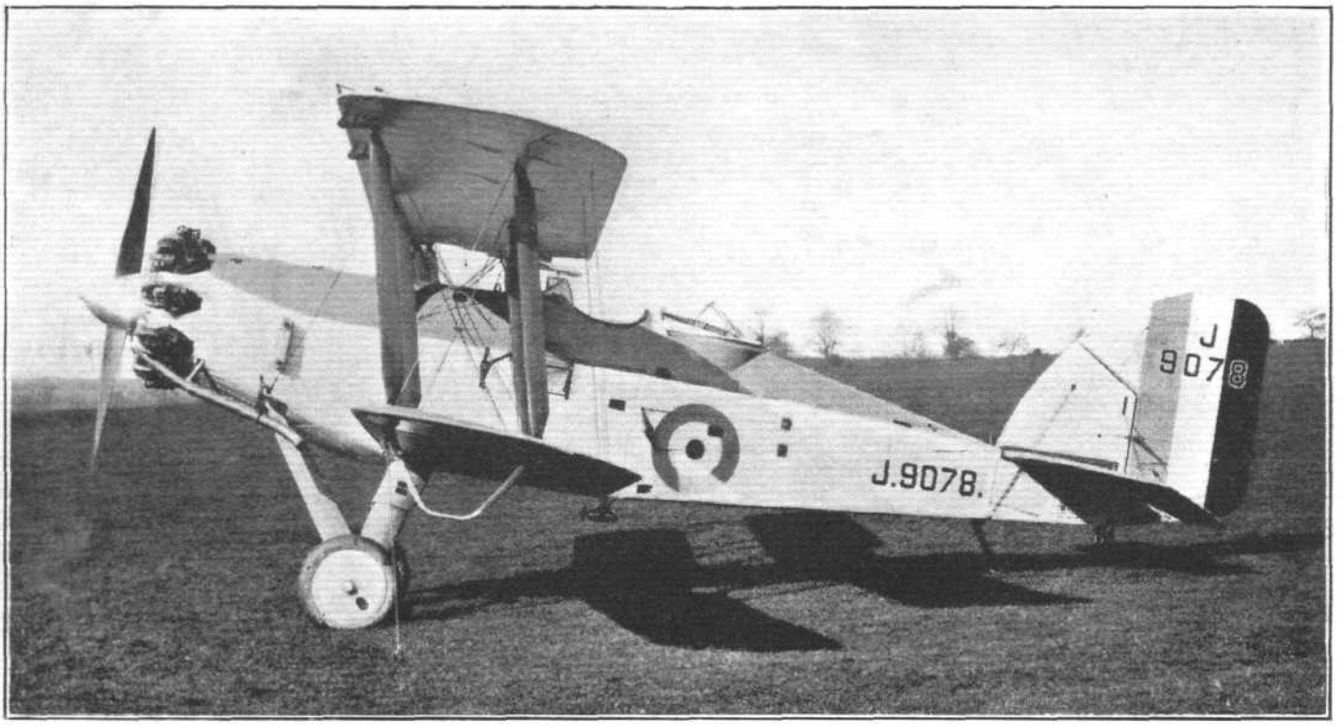
Speed at ground level	153 m.p.h. (247 km./h.).
Speed at 5,000 ft. (1,525 m.)	150 m.p.h. (242 km./h.).
Speed at 10,000 ft. (3,050 m.)	145 m.p.h. (234 km./h.).
Speed at 15,000 ft. (4,570 m.)	138 m.p.h. (223 km./h.).
Landing speed	59 m.p.h. (95 km./h.).
Climb to 10,000 ft. (3,050 m.)	10 mins.
Climb to 15,000 ft. (4,570 m.)	18 mins.
Service ceiling	18,600 ft. (6,100 m.).
Absolute ceiling	20,100 ft. (6,600 m.).
Range at full throttle (main petrol)	540 miles (870 km.).

"Everling Quantities" (as Landplane)

High-speed $\frac{\eta}{2k_D} = 27$

Distance figure $\eta \frac{L}{D} = 3 \cdot 9$

Altitude figure $\eta \frac{L}{D} \sqrt{2k_L} = 5 \cdot 4$



THE WESTLAND "WAPITI"

One "Jupiter VI" Engine

GENERAL

THE Westland Wapiti designed and built by the Westland Aircraft Works (branch of Petters, Ltd.), Yeovil, can be supplied either as a composite wood and metal machine, or as an all-metal machine.

It is suitable for bombing, reconnaissance, desert patrol work, photography, Army co-operation and advanced training.

The armament consists of a fixed Vickers' type gun firing forward for use by the pilot, and a Lewis gun or twin guns carried on the scarff ring mounting over the observer's cockpit.

Fuselage.—In the case of the composite machine the front portion of the fuselage is built up of square steel and duralumin tubes, while the rear portion is of wood, but in the all-metal machine the whole fuselage is constructed of square tube.

Wings.—In the composite machine the wings are constructed of wood, and in the all-metal type they are built of steel strip. In both cases the wing covering is fabric.

The ailerons are fitted with the Frise balance on all four wings.

The tail units are constructed of wood in the case of the composite machine and duralumin in the all-metal type.

Engine Installation.—The petrol is carried in the fuselage in a large cylindrical main tank fed to the engine by means of a Vickers' wind driven pump, and also in a tank feeding by gravity situated above the longerons. Provision is made for an additional tank, which can be very quickly fitted for long distance work.

The engine mounting is built up of steel tube, and is so arranged that all parts of the engine are readily accessible.

Undercarriage.—The undercarriage is of the Westland Oleo pneumatic type and has very good shock absorbing qualities. This type of undercarriage has been in use on many Westland machines and has proved very satisfactory.

Power Plant

Engine	Bristol Jupiter VI.
Total horse-power	450 b.h.p.
Propeller drive	Direct.
Fuel capacity (normal) ..	108 gallons (486 litres).
,, (additional tank)	131 gallons (490 litres).
Placing of fuel tanks ..	In fuselage.

Main Dimensions

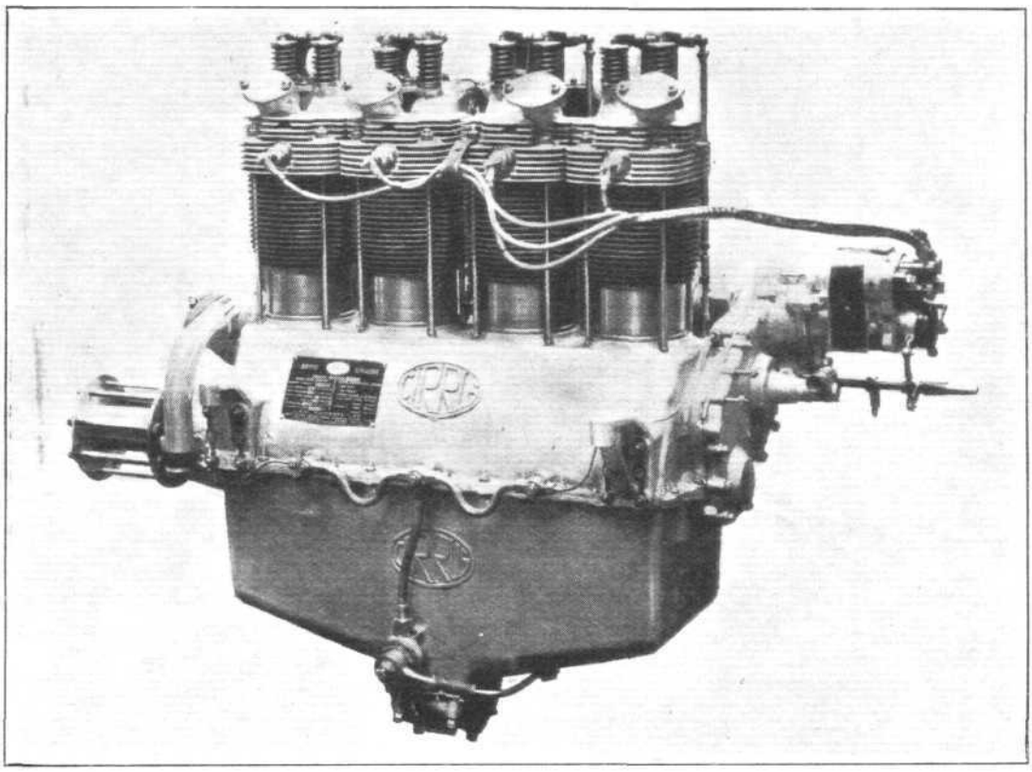
Wing span (top)	46 ft. 5 in. (14·18 m.).
Wing span (bottom)	46 ft. 5 in. (14·18 m.).
Wing chord	5 ft. 9 in. (1·75 m.).
Wing area	488 sq. ft. (45·3 m.²).
Length overall	31 ft. 8 in. (9·66 m.).

Weights and Loading

Weight empty	2,760 lbs. (1,254 kg.).
Load carried	1,808 lbs. (822 kg.).
Total loaded weight ..	4,568 lbs. (2,076 kg.).
Wing loading	9·36 lbs. per sq. ft. (45·8 kg./m.²).
Power loading (on 450 h.p.)	10·15 lbs. per h.p. (4·61 kg./CV).

Performance (On weight of 4,240 lbs.)

Speed at 5,000 ft. (1,525 m.)	133 m.p.h. (214 km./h.).
Speed at 10,000 ft. (3,050 m.)	129 m.p.h. (208 km./h.).
Speed at 15,000 ft. (4,570 m.)	123 m.p.h. (198 km./h.).
Landing speed	47 m.p.h. (75 km./h.).
Climb to 10,000 ft. (3,050 m.)	10·6 mins.
Climb to 15,000 ft. (4,570 m.)	19 mins.
Service ceiling	22,000 ft. (6,700 m.).
Absolute ceiling	24,000 ft. (7,320 m.).
Range at full throttle ..	500 miles (805 km.).



THE A.D.C. "CIRRUS" MARK II

THE 30/80 h.p. "Cirrus" Mark II engine is designed to meet the special requirements of light aircraft, and, as a result of experience with the earlier 27/60 h.p. "Cirrus" Mark I engine, new features are incorporated in the design of the later Mark II type which raise the horse-power, increase the reliability and lessen the cost of maintenance.

This engine is constructed to simple design, and while all unnecessary weight has been eliminated, efficiency has not been sacrificed to achieve lightness. Being a four-cylinder in-line air-cooled engine, the "Cirrus" possesses advantages of design in comparison with radial type engines, by reason of comparative immunity from frontal damage that is possible in the case of forced landings on soft ground. While this feature is chiefly due to design it is also attributable to sturdy construction.

Incidentally, the "Cirrus" engine was the first low-powered engine to pass the 100 hours' type test specified by the British Air Ministry.

Cylinders.—Cylinders and heads are separate, the former being cast iron, and the latter of an aluminium alloy, with air cooling fins.

Pistons.—Aluminium alloy castings, each fitted with cast iron rings. Hollow gudgeon pins of full floating type.

Valves.—One inlet and one exhaust valve is fitted to each cylinder. The valves are operated by rocking levers actuated by push rods to tappets in the crankcase from the camshaft, which is supported in three phosphor bronze and one ball bearing. The camshaft is driven by steel gears housed in the crankcase and timing gear cover.

Connecting Rods.—Duralumin forgings of "H" section.

Crankshaft.—Solid construction with direct drive to airscrew. Supported in three intermediate plain bearings and roller bearings at each end.

Airscrew Shaft.—Bolted to crankshaft and located in a radial thrust bearing.

Crankcase.—Aluminium alloy casting stiffened by three transverse webs. Housings are provided for the camshaft bearings and oil pump bearings. The oil base is formed by an aluminium alloy casting bolted to the crankcase.

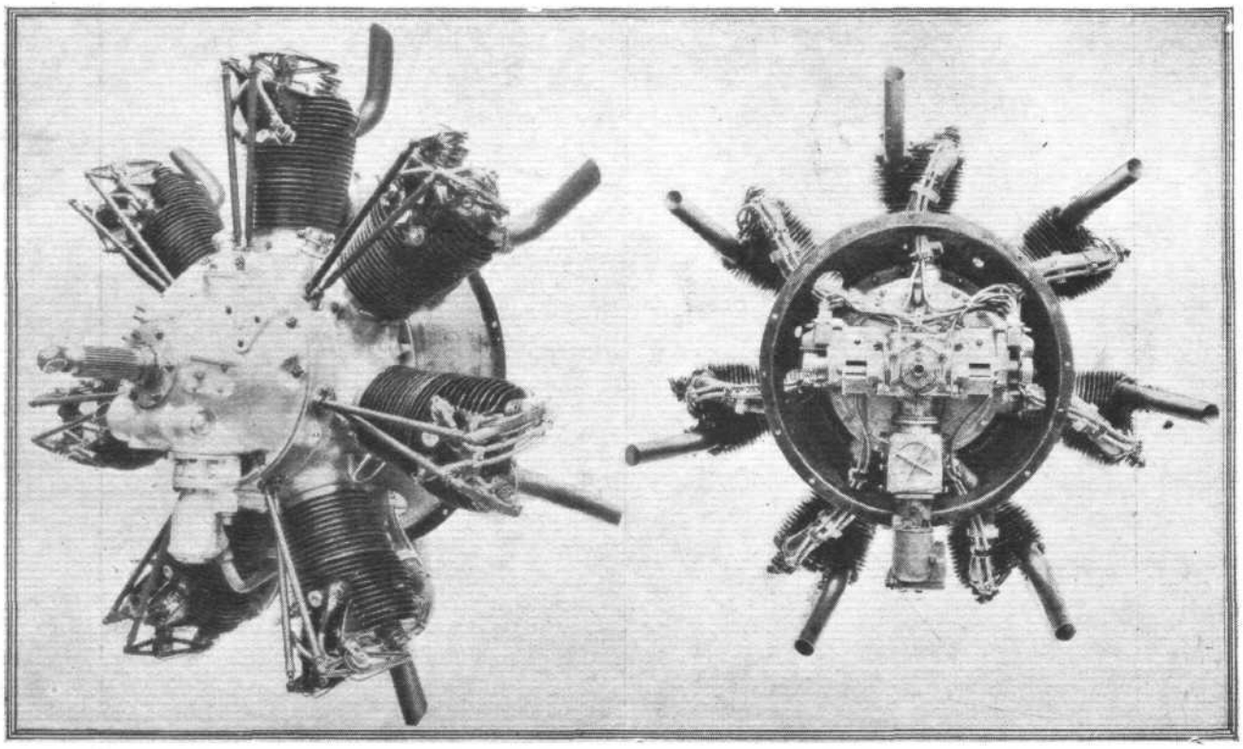
Lubrication.—The lower half of the crankcase, or the oil base contains 12 pints of oil, sufficient for about five hours' flight. The oil pump is located at the lowest part of the base, so that it is always flooded or self-primed with oil. The pump, which is of the gear type, driven by central spiral gear from the camshaft, forces oil through a filter, thence through the main delivery pipe to the oil gallery arranged on the port side of the engine. This oil gallery is connected to passages cast in the top half of the crankcase, which run to the centre and intermediate bearings; the oil is thus forced under pressure direct to each bearing.

Carburettor.—A Claudel Hobson R.R.C.H. carburettor is fitted, mounted centrally on the starboard side of the engine.

Ignition.—Two B.T.H.G.A.4 magnetos provide dual ignition to two sparking plugs on each cylinder. The magnetos are arranged in tandem on the starboard side of the engine, at the rear end. The forward magneto is fitted with an impulse starter, and the rear magneto is spigot mounted.

Starting Gear.—Turning the airscrew to operate the impulse starter has proved so adequate that a special starter gear is not fitted, but to meet the requirements of light seaplanes a special hand-starting gear can be supplied.

Number and arrangement of cylinders.—4 vertical in line.
Cooling.—Air.
Bore.—4·35 in. (110 mm.).
Stroke.—5·125 in. (130 mm.).
Total Swept Volume.—4,939 c.c.
Compression Ratio.—4·9 to 1.
Mean Effective Pressure.—110 lbs. per sq. in.
Power.—Normal, 75 b.h.p. at 1,800 r.p.m. Max. 80 h.p. at 2,000 r.p.m.
Airscrew.—Direct, right hand.
Carburettor.—Claudel Hobson R.R.C.H.
Ignition.—Dual, 2 B.T.H.G.A.4 magnetos.
Weight.—280 lbs. (127 kg.) dry.
Specific Weight.—Normal, 3·77 lbs./h.p. (1·4 kg./CV.).
Length o.a.—3 ft. 9·3 in. (1·161 m.)
Width o.a.—1 ft. 7 in. (0·482 m.)
Height o.a.—2 ft. 11·6 in. (0·904 m.).
Fuel consumption.—0·6 pints/h.p./hour.
Oil consumption.—0·019 pints/h.p./hour.



THE ARMSTRONG-SIDDELEY "LYNX"

Cylinders.—Mild steel forgings, with aluminium head screwed and shrunk on and locked by a ring. The barrel is threaded at its lower end for engagement with an adapter into the mouth of the crank-case, into which the barrel is screwed and locked by a ring which is contracted by a bolt passing through its bossed ends, thus wedging the cylinder and adapter on to the crank-case.

Pistons.—Of Y alloy forgings carrying two compression rings and one scraper ring. The hollow gudgeon-pin floats and is located laterally by circlips.

Valve and Valve Gear.—One inlet and one exhaust valve per cylinder. Operated through rockers, push rods, and tappets from a cam ring driven at one-sixth of the engine speed through a form of back gear from a sleeve mounted on the crankshaft. Two rows of three cams are machined on the cam ring, the front row operating the inlet, and the rear row the exhaust tappets. The timing bracket is attached to bridge pieces cast between the inner and outer sockets for the tappet guides. The cam ring is driven in the opposite direction to the camshaft. The tappets—which are interchangeable—are mounted one behind the other in guides common to each pair, and carry flat-faced rollers at their lower ends. They operate adjustable hollow steel push rods, which in turn control H-section rockers mounted in brackets on the cylinder-head platforms. The rockers are supported on two single-row journal ball bearings.

Crankshaft.—A single-throw hollow crankshaft, balanced by a gunmetal weight fitted to each web. It is supported on three roller bearings, one on each side of the crankthrow and the third, which is a steady bearing, towards the forward end of the shaft behind the airscrew hub.

Connecting Rods.—Split master and plain auxiliary rods are employed, the big-end of the former being separate from its shank. It is split across the diameter and provides not only the crank-pin bearing but also the housings for the outer wrist-pin bushes. The two halves of the ring are white-metal lined, keyed direct into holes machined in the ring. The auxiliary rods are attached to the master ring by wrist pins which float in the ends of the rods and in the cheeks of the master ring.

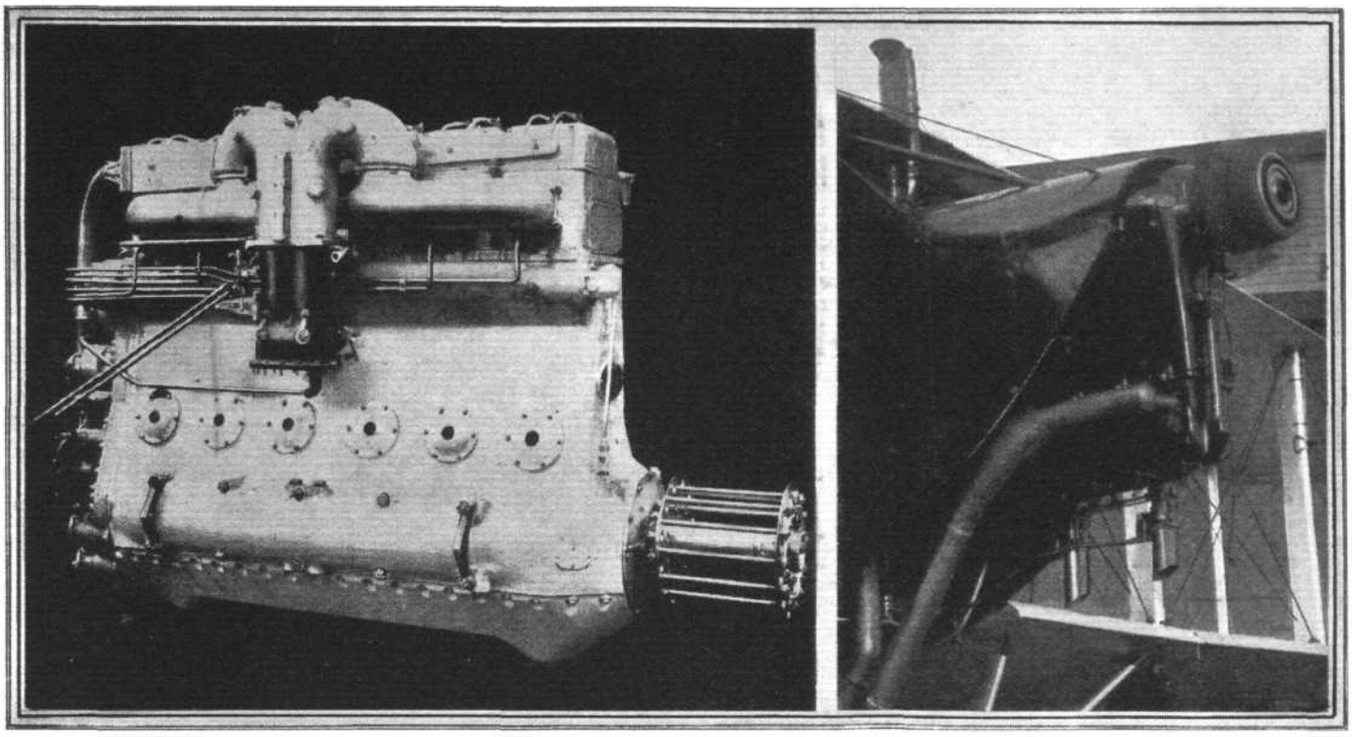
The Crankcase.—The crankcase assembly comprises the engine, body, the front cover, the fan induction casing, the rear cover, and the engine bearer. The body incorporates the cylinder sockets and valve gear, its forward face being sealed by the front cover, which houses the thrust-bearing assembly and provides the mountings for the oil pump, gas starter, distributor, and cowling supports. The fan induction casing seals the rear face of the engine body, houses the fan, and provides sockets for the inner ends of the seven induction pipes. Its rear face is closed by the rear cover, on which are mounted the two magnetos, tachometer drive, and heater box. The engine bearer, which is attached to the engine body provides the mounting for the engine in the aircraft.

The Fan.—The fan which assists the distribution of the mixture is keyed on the crankshaft, a phosphor-bronze gland nut maintaining an oil-tight joint between the hub of the fan and the rear face of the housing for the outer race of the rear main bearing.

Lubrication System.—The lubrication system employs a feed pump and a scavenge pump; the former is supplied from a tank and delivers to a filter in the front cover. From here the oil passes into the engine. Surplus oil drains into the sump, from which the scavenge pump delivers it to the heater box, whence it returns to the oil tank via the jacketed portion of the rear cover. The pump is skew-driven at half crankshaft speed, and a pressure-relief valve is incorporated with the unit.

Ignition.—The two magnetos are driven from a bevel wheel mounted towards the rear of a spindle driven from the rear end of the crankshaft. Provision is made for the engagement of a hand-starter unit, and a tachometer drive is incorporated in the design. Each magneto is spigoted and secured by studs and nuts to the sides of the extension at the back of the rear cover. Packing shims are interposed between each magneto and its seating to enable the depth of mesh of the driving bevel wheel with that of the magneto bevel wheels to be adjusted.

Carburettor.—A Zenith carburettor, type 65 G, is fitted beneath the rear cover and separated from it by an oil-jacketed junction-piece known as the heater box, through which passes warm oil from the scavenge pump. The mixture enters the rear cover from the heater box and passes into the fan-induction chamber, where it is churned up by the fan.



THE BEARDMORE "CYCLONE" AND "TYPHOON"

THE "CYCLONE"

THE Beardmore "Cyclone" engine is a six-cylinder-in-line unit of 8⅝ in. by 12 in. bore and stroke, and at its normal speed of 1,350 r.p.m. develops 850 h.p., or with a larger carburettor 950 h.p.

A similar engine of the inverted type, so mounted that the cylinders project downwards from the crank-case, is also produced, called the "Typhoon."

Though a very similar type has been produced in which the Diesel principle of compression ignition is employed and which runs on crude oil, the "Cyclone" and "Typhoon" run on petrol. As a matter of fact, their compression ratio is on the low side, being only 5·25 to 1. The charge is fired in the normal way by magnetos, the Watford C.6 S.M. being the standard type employed.

The weight of the "Cyclone" power unit is only 2,150 lbs. (975·2 kgs.) "dry"—*i.e.*, without radiator, fuel, or cooling water. The weight-power ratio is 2·4 lbs. (1·08 kgs.) per brake horse-power. The fuel consumption also, as demonstrated on the trials, is remarkably low, so that for flights of long duration the "Cyclone" should be a very economical proposition. The petrol consumption is 0·48 lb. (0·2 kg.) per brake horse-power per hour, and the oil consumption 0·01 lb. (0·004 kg.).

Taking round figures, the total consumption on full throttle running is 0·5 lb. (0·22 kg.) per horse-power per hour, or at the maximum power of 950 b.h.p. is 475 lbs. (215·4 kgs.) per hour. Thus the weight of the engine plus the fuel it consumes in one hour is 2,625 lbs. (1,190·7 kgs.), but for 10 hours the figure is only 6,900 lbs. (3,130 kgs.), which is remarkably low for an engine developing 950 b.h.p.

The great advantage of this engine is, of course, its simplicity of design, and the fact that a low speed is possible without recourse to gearing down of the propeller, which is a common source of trouble on other engines. On the "Cyclone" the propeller is attached directly to the crankshaft. The simplicity of design naturally makes for reliability and low maintenance costs. Another point in its favour is the low head resistance.

THE "TYPHOON"

The "Typhoon" is an inverted edition of the "Cyclone" engine. It develops between 800 and 900 b.h.p. at approximately 1,350 r.p.m., the six cylinders also being arranged in line.

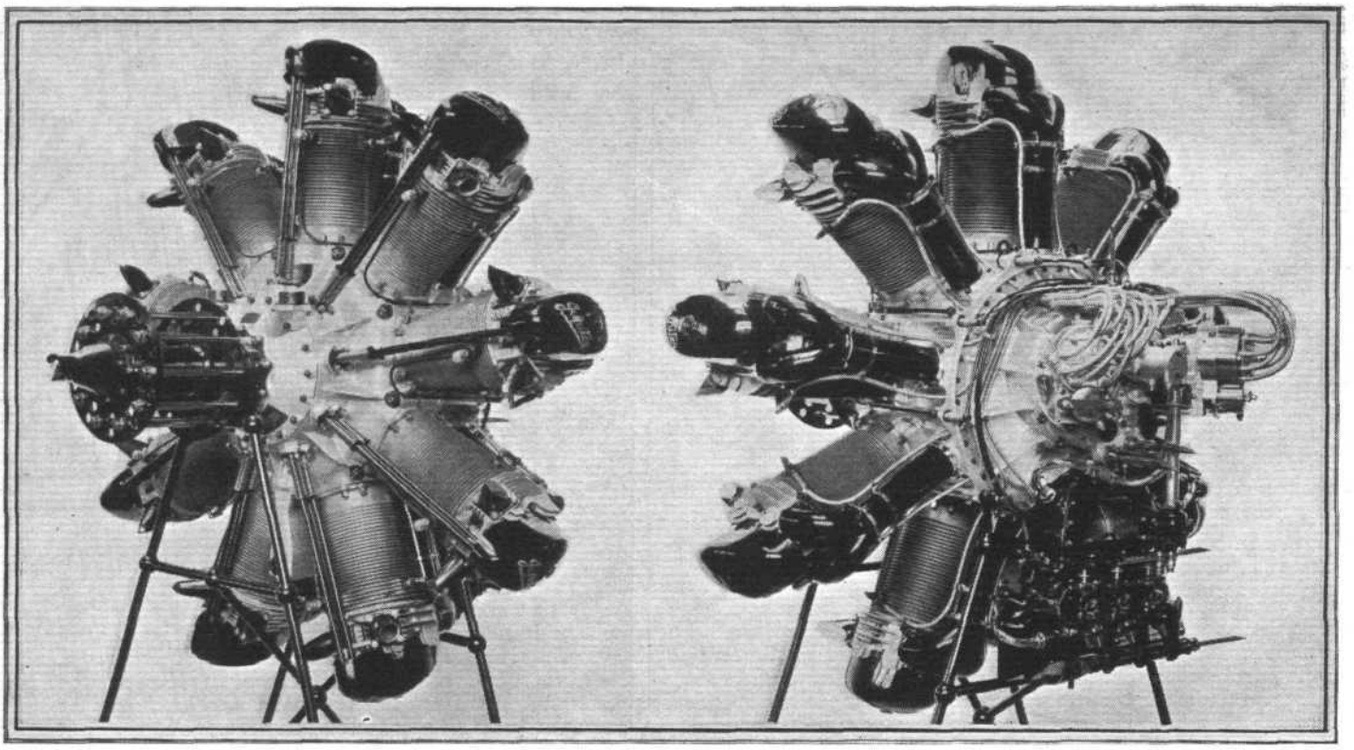
Generally speaking, very little has been done with the inverted type of engine for aircraft, yet it would seem to be the logical type for this purpose. In the case of the Beardmore "Typhoon" the inverted position is certainly the obvious one. To get the line of thrust somewhere near its proper position, it would be necessary to have the tall cylinders projecting upwards a very considerable distance, offering resistance and obstructing the view of the pilot. By inverting it, the thrust line is kept in its natural position, the cylinders hang down in the front of what has in any case to be a deep fuselage, and the nose, owing to the small width of the crank-case, can be narrowed down so as to obstruct the view forward as little as possible.

The use of a small number of large cylinders in the "Typhoon" necessarily makes for an engine having a small number of working parts, each of them relatively robust, and should therefore make for reliability and long life. Further, it makes for economy, for large cylinders, other things being equal, give somewhat higher thermal efficiencies than do small ones, and a small number of cylinders simplifies the problem of distribution and makes it easier to obtain uniform output and efficiency from all cylinders.

"Cyclone"

Number and arrangement of cylinders.—6 in line, vertical.
Cooling.—Water.
Bore.—8⅝ in. (219 mm.).
Stroke.—12 in. (304·8 mm.).
Compression.—5·25 to 1.
Power.—Normal, 850-950 h.p. at 1,350 r.p.m.
Airscrew.—Direct on crankshaft.
Ignition.—Two Watford C.6.S.M. magnetos.
Weight.—2,150 lbs. (975·2 kg.) dry.
Specific weight—2·4 lbs./b.h.p. (1·08 kg./CV.).
Length o.a.—6 ft. 8¼ in. (2·04 m.).
Width o.a.—2 ft. 11 in. (0·9 m.).
Height o.a.—5 ft. 1⅛ in. (1·56 m.).
Fuel consumption.—0·48 lb./b.h.p./hr. (0·21 kg./CV./h.).
Oil consumption.—0·01 lb./b.h.p./hr. (0·004 kg./CV./h.).

Note.—The "Typhoon" varies from above only in certain minor details.



BRISTOL "JUPITER" SERIES VII

Cylinders.—Composite construction, the barrels being machined from alloy steel forgings, with an integral combustion head, of cast aluminium alloy, carrying the valves, valve guides and rocker mechanism, and valve ports. Head secured to barrel by studs and set screws. Cooling fins turned from solid.

Pistons.—Cast aluminium alloy, slipper type, fitted with two gas and one scraper ring. The gudgeon pin floats in both piston and connecting rod, secured against end motion by circlips.

Valves.—Overhead, two inlet and two exhaust per cylinder, of special heat-resisting steel with hardened steel caps to take the thrust of rocker screws. Fitted with triple concentric springs. Operated—through tappets, push rods and overhead rocker gear—by large two-row, four-lobed cam, running concentric with the crankshaft and driven from latter by eccentric epicyclic gearing at one-eighth engine speed.

Connecting Rods.—One master and eight articulated rods machined from 65-ton nickel-chrome steel stampings. Master rod has a solid big-end lined with hardened steel sleeve, bearing directly upon bronze-backed white-metal-lined bush floating on the crankpin.

Crankshaft.—Built-up from hardened and tempered 60-ton nickel-chrome steel stampings. The shaft spigots in the maneton, being registered by a taper key formed integral with the eye of the maneton. The complete shaft is carried on two main roller bearings, located immediately behind each crank web, with a special Skefko double-purpose roller bearing at the air-screw end and a small white-metal steady bearing at the tail end. Drilled throughout for lightness and oil passages.

Crankcase.—In two main portions, front and rear halves, of stout well-ribbed section, machined from duralumin stampings. A face joint is made on the centre line of cylinders by nine collar bolts, the rear projections of which are utilised for attaching the engine to the aeroplane mounting. A rear cover carries the magnetos and magneto drive, petrol and oil pumps, and other auxiliary units.

Lubrication.—Engine-driven duplex-gear pump, the feed pump supplying oil at 60 lbs./sq. in. through hollow crankshaft to tail bearings, big-end, cam gear, etc. Oil returned from sump to tank by scavenge pump.

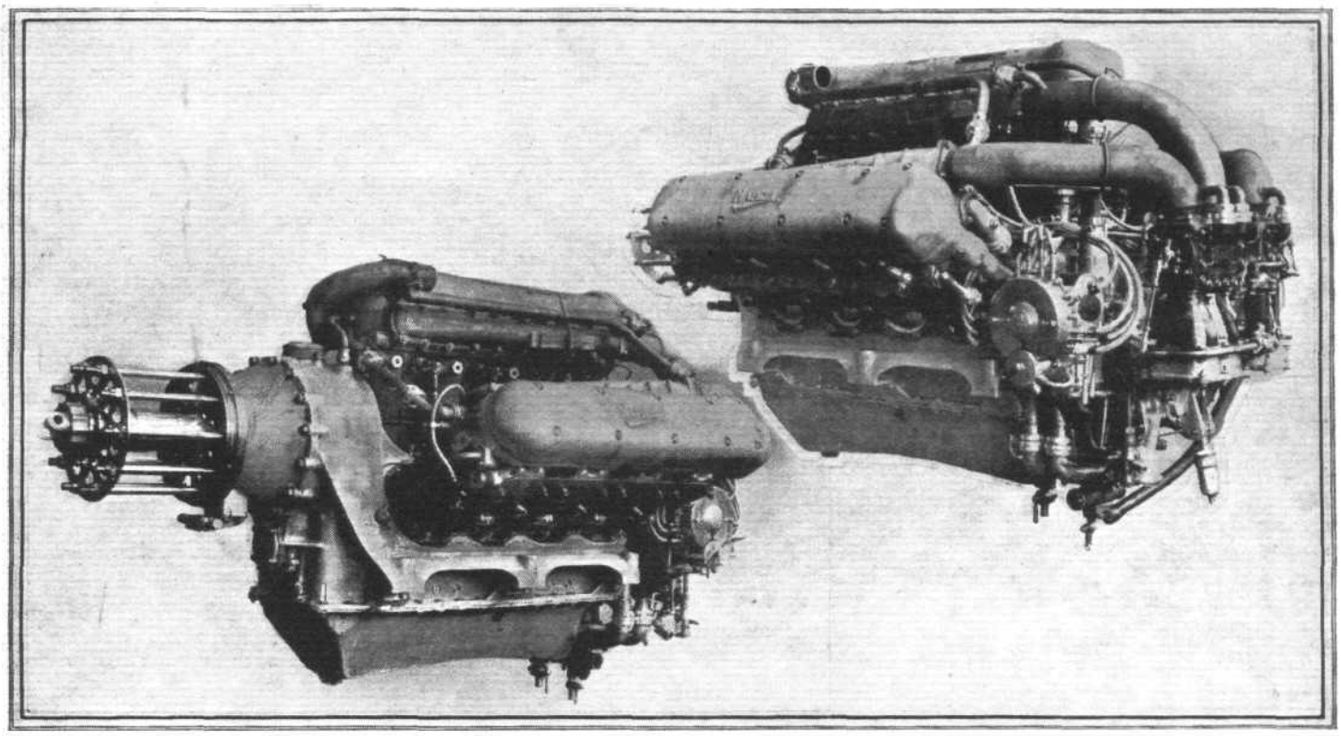
Carburettors and Induction System.—The Bristol "Triplex" carburettor, consisting of three variable-jet type carburettors formed in one body and operated by one set of controls, mounted at the rear and lower end of the crankcase on the intake side of the supercharger blower. The carburettor is heated by the hot oil drawn from the engine by the scavenge pump, the oil also circulating through the air intake elbow and the induction elbow. This ensures complete vaporisation of the mixture and prevents the possibility of the freezing-up of the carburettor at low temperatures. Additional heating is also provided by a forward type air intake drawing the carburettor intake air over the lower cylinders.

Ignition.—Dual by two H.T. magnetos mounted on the rear end cover of the crankcase and driven by bevel gearing from the tail end of the crankshaft. The ignition control is fixed.

Petrol Pump.—Gear wheel type on rear end cover, giving non-fluctuating flow direct to the carburettor. Positively driven from the gun-gear drive shaft through a ball-ended vertical shaft enclosed in a telescopic tubular duralumin shaft. Bearing surfaces automatically lubricated by the petrol circulating through the pump.

Supercharger.—An integral gear-driven supercharger is incorporated in place of the spiral induction system used on standard "Jupiters." mounted immediately behind the rear wall of the crankcase, concentric with and driven from the tail end of the crankshaft, around which it revolves. A system of slipping clutches ensures the impeller against shock loads. The mixture is drawn axially into the impeller and discharged radially via a fixed diffuser into an annular induction chamber, thence to the cylinders via nine radial pipes.

Number and arrangement of cylinders.—9, in single row radially.
Cooling.—Air.
Bore.—5·75 in. (146 mm.).
Stroke.—7·5 in. (190 mm.).
Compression ratio.—5 to 3.
Power.—Normal, 420 b.h.p. at 1,755 r.p.m. and 12,000 ft. maximum, 440 b.h.p. at 1,950 r.p.m. and 15,000 ft.
Airscrew.—Clockwise (airscrew end). Direct.
Carburettor.—Bristol "Triplex" oil heated.
Ignition.—Dual, 2 H.T. magnetos.
Weight.—760 lbs., bare (39·8 kg.).
Length o.a.—4 ft. 8 in. (apx.) (1·4 m.).
Width o.a.—4 ft. 8 in. (apx.) (1·4 m.).
Height o.a.—4 ft. (apx.) (1·2 m.).
Fuel consumption.—27·5 gallons/hour (123·75 lit./h.).
Oil consumption.—5·2 pints/hour (2·9 lit./h.).



THE NAPIER "LION" SERIES XI

Cylinders.—Steel forgings, machined all over, with steel water jackets. Detachable aluminium cylinder head containing inlet and exhaust passages, valves and valve actuating mechanism.

Pistons.—Aluminium alloy, fitted with two gas and two scraper rings. Hollow gudgeon pins of large diameter.

Valves.—Two inlet and two exhaust per cylinder, each having two coil springs and operated direct by overhead camshafts driven through bevel gearing by vertical shafts from the crankshaft. The whole of the valve mechanism is enclosed within a detachable aluminium case.

Connecting Rods.—Machined from special high-grade steel. The master rod, coupled to the pistons of the vertical block of cylinders, has lugs formed on either side, to which are attached the short auxiliary rods for the right and left groups of cylinders respectively. The big ends are white metal lined. Anchor pins and other parts work in bushes of ample size

Crankshaft.—Machined from a solid steel forging. The four throws are in one place and all journal bearings and crankpins are of large diameter and bored out. The shaft is carried in five substantial roller bearings and a large plain bearing at the forward end.

Airscrew Drive.—Airscrew shaft rotates clockwise (viewed airscrew end), and is carried on two roller bearings and fitted with a large double thrust ball bearing, to take the thrust of either a tractor or pusher airscrew. The reduction between airscrew and crankshaft is through high-grade alloy steel spur gears. The shaft and its gear and cover can be withdrawn from the crankcase.

Crankcase.—Of aluminium alloy, stiffened at all necessary points, and having arms on either side for attachment to engine mounting of aircraft. The front end encloses the reduction gearing for the airscrew shaft, together with the shaft and bearings. The rear end cover contains two scavenge oil pumps, pressure oil pumps, and the drive for the camshafts, magnetos, water and oil pumps.

Lubrication.—By pressure throughout to big ends, gudgeon pins, bearings of camshaft and forward bearing of crankshaft. The reduction gears are lubricated by oil projected on to the teeth from a pipe connected to the crankshaft lubricating system. Valve tappets and cams are lubricated by the oil escaping from the camshaft bearings, which drains into the sump. An adjustable pressure relief valve is incorporated in the system. Two suction and one pressure-type pump are fitted; the former scavenge the oil sump and return the oil to the supply tank, and the latter takes the oil from the supply tank and delivers to the working parts of the engine under pressure. Two oil filters are provided, one between the suction pumps and supply tank, and one between latter and pressure pump.

Water Pump.—Centrifugal type, mounted to rear end of engine and running at crankshaft speed. Its spindle is fitted with a gland and a screw-down greaser. Water is delivered through a separate outlet to each of the three cylinder blocks.

Carburettor and Induction System.—Triple Napier-Claudel carburettor, water-jacketed. The body, of aluminium, is carried on a bracket on the rear end cover. The gas-inlet pipes to the induction on the cylinder heads are of steel and water jacketed. Altitude control, interconnected with throttle.

Ignition.—Two special 12-cylinder magnetos, rotating anti-clockwise, mounted on platforms at rear of engine. Special distributors are fitted to facilitate starting by hand, and advance and retard links and levers are interconnected with the throttle control.

Starter.—Napier petrol starter provided, by means of which fuel is pumped into the cylinders and ignited by a hand-starting magneto (not supplied with engine) operated through the engine magneto distributors.

Number and Arrangement of Cylinders.—12, in three blocks of four each, 60 deg.

Cooling.—Water.

Bore.—5½ in. (140 mm.).

Stroke.—5⅛ in. (130 mm.).

Compression Ratio.—6 to 1.

Power.—Normal, 530 b.h.p. at 2,350 r.p.m. Maximum permissible, 570 b.h.p. at 2,585 r.p.m.

Airscrew.—Clockwise (airscrew end) at 1 to 1·885 reduction ratio of crankshaft.

Carburettor.—Triple Napier-Claudel.

Ignition.—Two, special 12-cylinder magnetos.

Weight.—995 lbs. (452 kg.), complete with airscrew boss, reduction gear, hand starting gearless magneto.

Specific Weight.—On rated power, 1·879 lbs./h.p. On average power at maximum speed, 1·745 lbs./h.p.

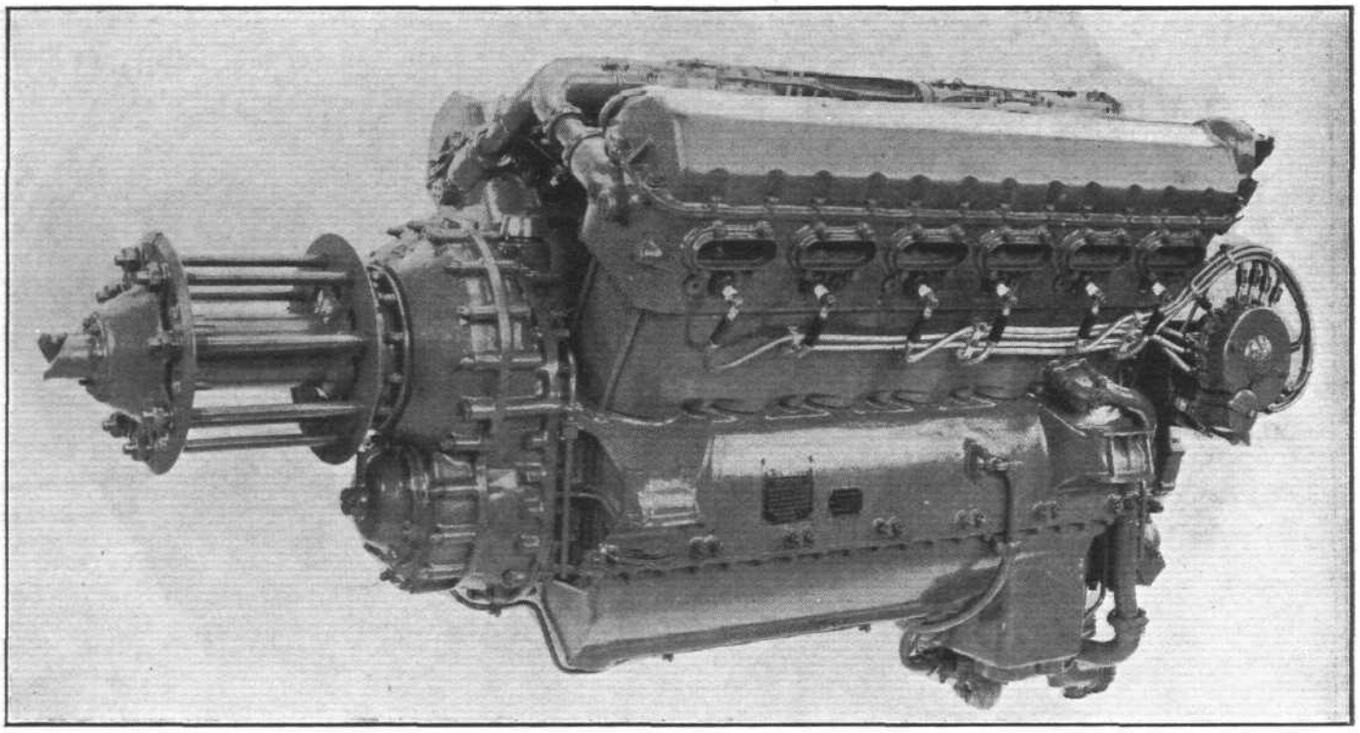
Length o.a.—5 ft. 1 in. (1·55 m.).

Width o.a.—3 ft. 6 in. (1·067 m.).

Height o.a.—3 ft. 3 in. (0·99 m.).

Fuel Consumption.—Average at full load, 0·50 lb. h.p. hour (0·227 kg./C.V./h.).

Oil Consumption.—Average, 0·0235 lb./h.p./hour (0·0168 kg./CV./h.).



THE ROLLS-ROYCE TYPE F

Cylinders.—In blocks of six, of cast aluminium, with steel liners and renewable valve seats and integral heads.

Pistons.—Special aluminium alloy forgings machined all over. Fitted with three compression rings (above gudgeon pin) and one scraper ring at base of skirt. Gudgeon pins of 5 per cent. case-hardening nickel steel, hardened and ground, floating in piston bosses and connecting rod small ends.

Connecting Rods.—" H " section " forked," of 3½ per cent. nickel steel forgings, heat treated to a high Brinell. A divided white-metal lined steel block is bolted to the forked rod, the plain rod working on the centre portion of the steel block which has a white-metal bearing surface. Small ends have floating phosphor-bronze bushes.

Valves.—Two inlet and two exhaust per cylinder, of special steel. Operated by overhead camshafts and rockers, totally enclosed. Inlet and exhaust valves of each cylinder block are operated by one camshaft.

Camshafts.—Of 5 per cent. case-hardening nickel steel bar machined, with hardened cam follower faces and hardened steel adjustable tappets. Driven by inclined tubular shafts, with bevel gears, from rear end of crankshaft through medium of a spring drive. Driving shafts supported in ball bearings and enclosed in tubular casings.

Crankshaft.—Six-throw type, machined from a nickel-chrome steel forging carried in seven bearings, all journals and crankpins being bored for lightness and for passage of lubricating oil to bearings and connecting rods. The main bearings consist of divided mild steel shells, white metal lined, held in the upper half of the crankcase by special caps secured by bolts on each bearing.

Airscrew Drive.—A single spur gear reduction is fitted at the front end of the crankshaft, through which is transmitted the drive to the airscrew (which rotates anti-clockwise from front). The pinion is driven from the crankshaft through a short shaft, having teeth at the inner end to engage an internally-toothed flange bolted to the crankshaft and at the outer end teeth engaging with teeth cut inside a part of the gear pinion. This shaft prevents loads from the gear pinion coming on to the crankshaft. The gear wheels are carried on large-size roller bearings mounted in a cast aluminium case.

Crankcase.—Special aluminium alloy, in two halves of box section, ribbed to give stiffness.

Lubrication.—" Dry sump " system, the bulk of the oil being carried in a service tank separate from the engine. Two scavenger pumps and one pressure pump are carried at the rear end of the lower half crankcase, one of the former drawing oil from forward end of the crankcase, the other delivering the oil to the service tank. The pressure pump takes its supply from the service tank and delivers it under pressure to the main bearings, and other parts. A compound relief valve regulates the pressure in the main system and also adjusts the pressure of an auxiliary low-pressure system supplying oil to the camshaft bearings and their drive mechanism.

Water Pump.—Centrifugal type, mounted below auxiliary gear case and driven from same through serrated couplings.

Carburettors.—Two Rolls-Royce " Duplex " carburettors, mounted between cylinder blocks, fitted with hand control by which the flow of petrol from the float chamber to the jet is regulated to suit varying altitudes.

Ignition.—Two 12-terminal high-tension magnetos, supported on the auxiliary gear-case from which they are driven by serrated couplings giving a fine and positive adjustment of the ignition timing. Two plugs per cylinder are fitted.

Starter.—Hand starting gear is fitted, mounted on the auxiliary gear drive casing, and arranged so that the starting handle can be used on either side of the engine.

Number and arrangement of Cylinders.—12 in two blocks of six at 60°.

Cooling.—Water.

Bore.—5 in. (127 mm.).

Stroke.—5·5 in. (140 mm.).

Compression Ratio.—F.XIA and F.XIIA—6 to 1 ; F.XIB and F.XIIB—7 to 1.

Power.—Normal, F.XIA and F.XIIA—490 b.h.p. at 2,250 r.p.m. F.XIB and F.XIIB—480 b.h.p. at 2,250 r.p.m.

Airscrew.—Reduction gear ratios, F.XIA and F.XIB—0·632 ; F.XIIA and F.XIIB—0·552.

Lubrication.—Pressure : dry sump.

Carburettor.—Two R.-R. " Duplex."

Ignition.—Two H.T. magnetos.

Weight.—865 lbs. (301·76 kg.), including carburettors, magnetos, engine feet, reduction gear, and airscrew hub, but excluding exhaust boxes, radiator, airscrew, oil, fuel and water.

Length o.a.—5 ft. 3·4 in. (1·611 m.).

Width o.a.—2 ft. 0·4 in. (0·619 m.).

Height o.a.—2 ft. 10·5 in. (0·876 m.).

Fuel Consumption.—Normal, F.XIA and F.XIIA—30 galls./hr. (135 lit./hr.) ; F.XIB and F.XIIB—28·25 galls/hr. (127 lit./hr.).

Oil Consumption.—Normal, 5 pts./hr. (2·8 lit./hr.).

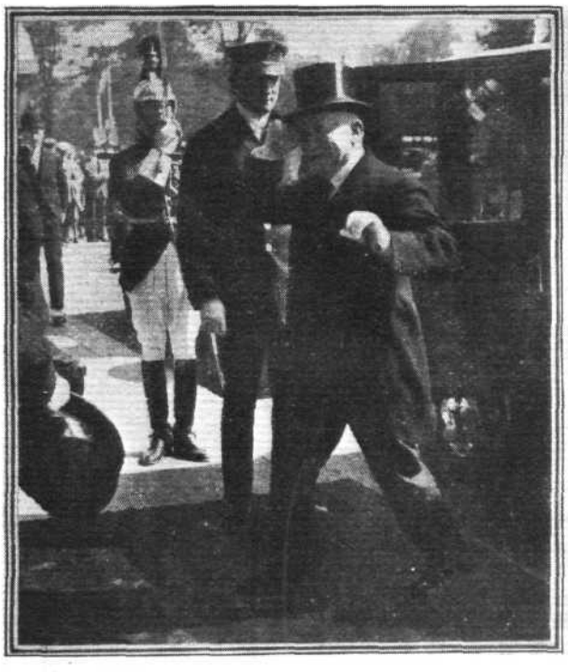
XI^e Exposition Internationale de l'Aeronautique, more familiarly spoken of on this side as the French Aero Show, was officially opened by the President of the French Republic on Friday, June 29. The President, as is the custom, made a tour of the stands in the Grand Nef, accompanied by a number of distinguished personages, among whom, representing Great Britain as chairman of the S.B.A.C., was Capt. P. D. Acland, of Vickers, Ltd. It is gratifying to be able to record that the President spent a considerable time on the British stands of Armstrong Siddeley Motors, Ltd., and the Bristol Aeroplane Co., Ltd., and on the latter he desired to be given a great deal of information concerning the forms of steel construction employed by that firm. All told the President spent a couple of hours in visiting the various stands, and the Grand Palais was then thrown open to the general public, which visited the exhibition in numbers much larger than those one is accustomed to on a "first day."

Generally speaking, this year's Paris show is smaller, as regards the number of complete machines (of which there are only some forty exhibited), than certain previous shows, and those familiar with the French aircraft industry will regret the absence of several important French firms. Apart from that, the feature of the show may, perhaps, be said to be the first post-war participation by Germany. The German aircraft industry has taken vast stand space, and occupies the whole of one end of the Grand Nef, but one rather agrees with the opinion expressed by a French newspaper that the Germans have not quite managed to make the most of their opportunities, the machines exhibited having nothing particularly new to show.

THE GERMAN SECTION

With the exception of France, the German exhibit shows the greatest number of complete aircraft with five machines, Italy coming next with three, Czechoslovakia with two, Holland with two, and Great Britain with one. Thus the visitors account together for 13 complete aircraft, and France for about 28. It will thus be seen that this year the exhibition is of a truly international character.

The banners above the German stands bear the following names: Dornier, Focke-Wulf, Bayerische Flugzeugwerke, Klemm Daimler, Heinkel, Albatros, Junkers, Rohrbach, and



["FLIGHT" *Photographs*

THE PRESIDENT OF THE FRENCH REPUBLIC AT THE GRAND PALAIS: Arriving, and admiring *the Bristol Single-seater Fighter.*

Arado. These are not, however, all represented by actual machines, some exhibiting photographs and models only. This is the case, for instance, with Dornier, who has a large mahogany "wall", let in, in which are mounted photographs of the four-engined Dornier "Superwal" with "Jupiter" engines that beat several world's records some time ago. A beautifully made metal model of this machine is also shown. The Focke-Wulf firm also is at present showing models only, while Rohrbach is represented by a piece of wing showing the form of constructtion which is typical of this German designer.

Arado (G.M.B.H.).—The two-seater biplane exhibited by this firm is very flattering to Fokker if the old saying is true that "imitation is the sincerest form of flattery." We doubt if even Mr. Stephan could distinguish the Arado from one of his own machines. Even the arrangement of the shock-absorbing legs is similar and shows the peculiar "herringbone" formation of the rubbers. The machine is fitted with a B.M.W. V.A engine, with the radiator placed under the fuselage.

Klemm-Daimler.—One of the small ultra-low power monoplanes with 20 h.p. Mercedes flat twin engine is shown. As this has been described and illustrated in FLIGHT, it will be familiar to our readers. It is, however, of interest to learn that recently one of these machines was fitted with one of the little nine-cylindered, 40 h.p. Salmson radial air-cooled engines, and actually took off with three up in spite of the fact that the machine was fitted up as a seaplane.

Heinkel Flugzeugwerke.—The Heinkel H.E.5 exhibited is similar to the machine which won the seaplane competition at Warnemünde. It is a low-wing monoplane three-seater of all-wood construction, with three-ply wing covering and flat-sided, flat-bottomed, single-step floats. The engine is a B.M.W. VI, and at a total loaded weight of 2,905 kgs. (6,400 lbs.) the machine is certified by the D.V.L. to have a top speed at sea level of 230 km.-hrs. (143 m.p.h.).

Albatros Flugzeugwerke.—The Albatros "ASS" is a two-seater school machine fitted with B.M.W. engine, and is of "mixed" construction, with welded steel tube fuselage and all-wood wings. It is stated to be a very easy machine to fly, and to have quite a good performance. The radiator is placed under the fuselage, but, unlike the Arado, it is faired into the bottom and provided with shutters.

Junkers-Werke.—Not unnaturally, the Junkers works have elected to exhibit a machine of the same type as the "Bremen," which recently made the flight across the Atlantic from Ireland to Labrador. Of the W. 33 type, this machine is, like all Junkers aeroplanes, of all-metal construction, with the corrugated covering typical of this firm. Except for the extra large petrol tanks the trans-oceanic machine was a standard W.33.

THE ITALIAN SECTION

The Italian Air Ministry makes quite an impressive show with three machines, which in size at least cover a very wide range. The largest is the Savoia-Marchetti S.55 twin-hull flying-boat of the type in which Pinedo crossed the South and North Atlantic. Fitted with two Isotta-Fraschini "Asso" engines of 500 h.p. each, the S.55 exhibited is a torpedoplane, although not shown with the torpedo in place. The twin hull arrangement lends itself to the carrying of a torpedo centrally. The two hulls each have a gun position with Scarff ring in the nose and one in the tail, and "blind spots" should be reduced to a minimum. The particular machine on view was flown from Sesto Calende on Lake Maggiore and alighted in Paris on the Seine at Suresnes, crossing the Alps en route. The medium-size machine is represented by a Fiat R.22 with 550 h.p. A.22 Fiat engine. This machine is described as a "Strategic Reconnaissance" two-seater, and is a sesqui-plane with rigid strut bracing arranged in the form of a Warren truss.

At the lower end of the scale in size, but at the top in speed, is the Macchi M.52 Schneider Cup type on which de Bernardi established a world's record of 512·776 km./h. (318 m.p.h.). The engine is described as a 1,000 h.p. Fiat weighing 400 kg. (880 lb.).

CZECHOSLOVAKIA'S CONTRIBUTION

An Aero A.23 commercial biplane as used on the Czech State air lines represents the commercial side of the Czecho-slovak aviation, while the military side is represented by an Avia B.H.33 single-seater fighter with Walter "Jupiter" engine. The indented fairings now becoming popular are fitted behind the cylinders of the engine, and the machine has generally a "clean" appearance. It is credited with a top speed of 275 km./h. (170 m.p.h.) maximum, while at 5,000 m. (16,400 ft.), the speed is still as high as 260 km./h. (161 m.p.h.). The machine is of typical Avia construction, with ply-wood covered fuselage.

HOLLAND

This year the task of representing Holland is executed by the Fokker firm, who exhibit two machines, of which one is a new three-seater reconnaissance monoplane of rather novel type, and the other a single-seater fighter shown in skeleton. The Fokker method of welded steel

["FLIGHT" *Photograph*

A GENERAL VIEW: In the foreground the Breguet commercial machine. On the left may be seen the port wings of the Levasseur torpedo plane, and farther back, the little Liore & Olivier two-seater flying-boat.

["FLIGHT" *Photograph*

IN THE GRAND PALAIS : View looking North. In the foreground the Junkers W.33 type, "Bremen." Some distance behind that the large Farman passenger carrier.

tube construction is shown in every detail, and the simplicity of this form of joining members is well illustrated. A welded aluminium tank of cylindrical shape shows very neat workmanship, and the machine altogether makes a good impression for a simple and inexpensive type. In addition to the two machines, Fokker shows an engine unit of the interchangeable type which this firm has standardised. The particular specimen carries a "Jupiter."

GREAT BRITAIN

Taking the visiting nations first, and giving them in the order of aircraft exhibited, Great Britain should come next,

["FLIGHT" *Photograph*

IN THE GRAND PALAIS : View looking South. In the foreground the Aero cabin biplane, as used on Czechoslovak air lines. Beyond, the CAMS flying-boat. On the right, the tail of the twin-hull Savoia S.55.

but as the British exhibits are being dealt with in rather more detail this week, the British section has been placed after the French, and will be found on pp. 574—579.

FRANCE

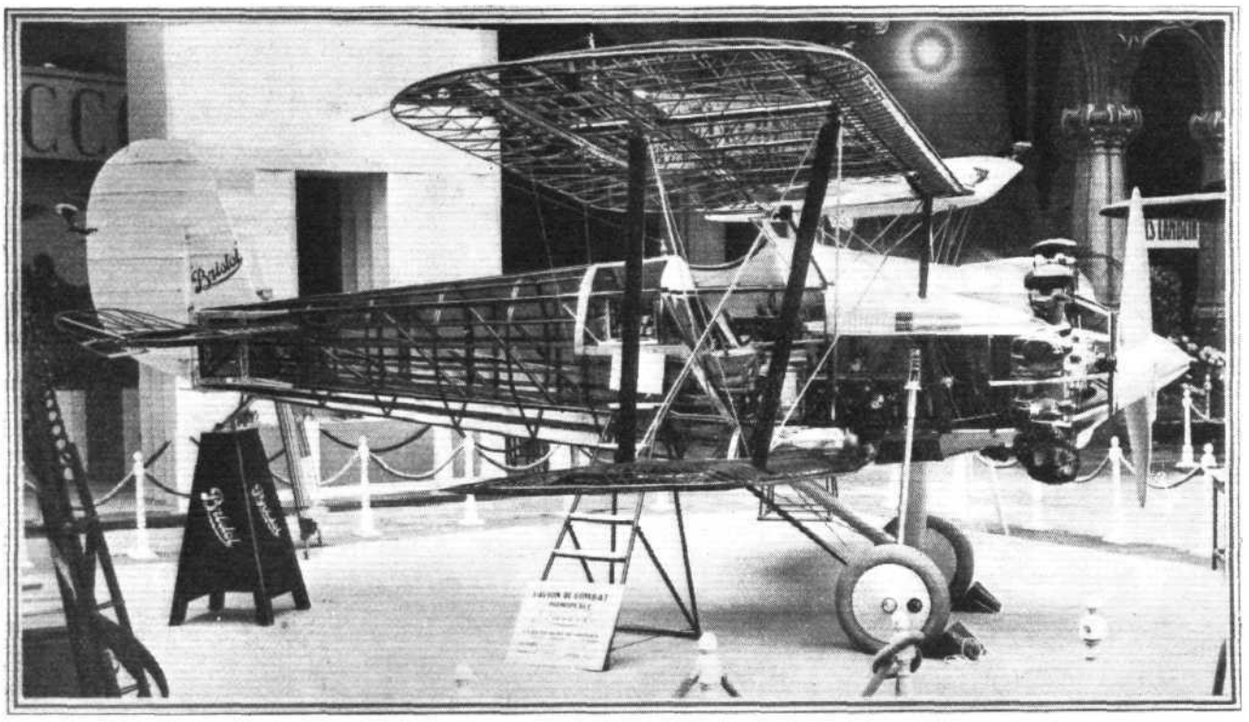
As already mentioned, it is somewhat disappointing to find that a good many French firms of high standing are absent from the show this year. What the reason is we have no means of knowing, but it is to be assumed that it is the same as that which prevented a number of British firms from exhibiting, *i.e.*, the question of expense. As several of the firms produce very interesting machines, their absence can only be regretted. In the following notes will be found a brief *résumé* of the exhibiting French firms, given in alphabetical order.

Bernard (*Société des Avions Bernard*):—Of the two machines exhibited by this firm, one is a commercial monoplane and the other a small monoplane with Hispano engine; it has the appearance of a single-seater fighter, but no gun is mounted.

The Bernard 191 T is a passenger monoplane (cantilever) with "Jupiter" engine. Its cabin arrangement is unusual, but it is an all-metal sesquiplane with an area of 55·86 m.² (600 sq. ft.). The total loaded weight is given as 3,320 kg. (7,300 lb.), and the commercial speed as 200 km./h. (124 m.p.h.). The disposable load is stated to be from 1,580 kg. to 1,670 kg. (3,470 lb. to 3,670 lb.).

Cams (*Chantiers Aero-Maritimes de la Seine*).—Described as a "Hydravion Postal a grand Rayon d'Action" the Cams 53 is a twin-engined flying-boat biplane with the engines (Hispano-Suiza) in tandem mounted under the top plane. The flying-boat hull is of wood construction, and it is interesting to note that the planing bottom now has two steps with rounded V-formation. The beam is carried up the sides without that reduction which one usually finds in British flying-boat hulls. In fact the beam a couple of feet above the chines is slightly greater than at the chines themselves, the sides being slightly convex. The forward cockpit is provided with a "conservatory roof," and an interesting feature is that outboard petrol tanks form the roots of the lower plane.

Caudron.—Three machines are exhibited on the Caudron stand. One is the little C.109 light 'plane two-seater parasol monoplane with 40 h.p. 9-cyl. Salmson engine. The other



["FLIGHT" *Photograph*

"THE CAMEO OF THE SHOW": This was the expression used by a French engineer in reference to the Bristol Single-seater Fighter. The machine is exhibited stripped to the centre-line.

in that forward (*i.e.*, just aft of the "Conduite Interieure" cockpit for the pilot) is a very tiny cabin with two seats (presumably to be reserved for honeymoon couples), communicating with the main cabin which has accommodation for six passengers. The forward cabin has a door on the starboard side, while the door of the main cabin is on the port side. The petrol tanks are carried in the wing, one on each side, and are let in flush with the wing surface. The machine makes a favourable impression, and with eight passengers on one engine should be quite an economical proposition. The Bernard 20 monoplane, assumed of the C.1 class, is an all-wood construction, with aerodynamic lines very similar to previous "Ferbois" monoplanes.

Bleriot-Aeronautique.—This year Bleriot makes a rather disappointing show with but a single machine, a single-seater fighter Spad S.91² with Hispano-Suiza "broad arrow" engine. The front portion of the fuselage is covered with sheet aluminium, but the machine is mounted in the attitude of a climbing turn and it is very difficult to examine it in detail.

Breguet (*Société Anonyme des Ateliers d'Aviation Louis Breguet*).—Represented by two machines, of which one, the type XIX "Nungesser-Coli" on which Costes and le Brix made their famous flight, speaks for itself. The other is a transport machine, type 280 T, with 500 h.p. geared Renault engine. Like the Bernard 191 T it carries eight passengers,

is a two-seater fighter, type C.140 of typical Caudron lines and construction, fitted with a Salmson air-cooled engine. The most interesting machine on this stand is undoubtedly the one shown in skeleton. If we are not mistaken this is a Descamps similar to that exhibited at the last Paris Show, and it is assumed that this is now being built by the Caudron firm. It is an all-metal machine incorporating a number of interesting features, but as we hope to return to it in more detail in next week's issue, it will be unnecessary to say any more here.

Farman.—Strictly speaking there is only one complete machine shown by Henry and Maurice Farman, as the other has had its wings reduced to stumps for exhibition purposes. This is a commercial biplane passenger-carrier "de Luxe," the fuselage of which forms a large cabin with accommodation for 20 passengers seated, or 12 passengers reclining on berths. Both types of cabin equipment are shown. The two 500 h.p. Farman engines are mounted in tandem in the top plane. In fact one visitor described the arrangement as "parasol engines." Some idea of the size of this ambitious machine may be gathered from the fact that the wing area is 172 m.² (1,850 sq. ft.), while the total loaded weight is 8,000 kg. (17,600 lb.). The cruising speed is given as 160 km./h. (100 m.p.h.).

The second Farman machine is a little five-seater (four passengers) cabin monoplane equipped with the Gnome-

Rhone "Titan" engine. Of a type known in France as "Vedette," the Farman type 190 is obviously the opposite number to the American monoplanes which have become so popular of recent years, and of which Lindbergh's "Spirit of St. Louis" was an early example to visit Europe. The Farman version is a strut-braced high-wing monoplane, with the chassis struts (telescopic) attached to the front lift strut.

Hanriot (*Société des Avions Hanriot*).—The Hanriot H.460 with 5-cyl. Lorraine radial air-cooled engine is an all-metal machine which is normally a school type but which can readily be converted into an *avion sanitaire*, the fuselage being designed with one side easily removable and space inside for a stretcher case. The other machine, the H.431, is of similar construction, and is shown in skeleton. It is termed an "Avion de Liaison," and is stated to be an advanced training machine convertible into a two-seater reconnaissance biplane. In the construction of the fuselage use is made of square-section Duralumin tube, but as we expect to refer to this in more detail next week, it will suffice if we conclude here by mentioning that the engine is a 7-cyl. Lorraine.

P. Levasseur.—For many years this firm has devoted its energies to the production of *avions marin*, and this year M. Charles Frechet, the firm's managing director, who always seems particularly glad to see English visitors and who speaks English fluently, points with pardonable pride to a torpedo 'plane of very original design, in which most of the well-tried Levasseur features have been retained and several new ones introduced. The machine exhibited carries the somewhat mystic letters P.L. 7 T^2B^2b, which seems to be a formula not met with in English aerodynamics! The power plant is a geared Renault of 550 h.p. The machine is designed for use on the aircraft carrier Béarn. Fuller particulars next week.

Lioré et Olivier.—Two widely-differing types are exhibited by this firm. One is shown in skeleton and dismantled: this is the LeO 20 Bn 3, a night bomber with two "Jupiter" engines. The fuselage makes use of square-section duralumin tube as longerons, the same tube being used as struts in some portions, while in others tubes of circular cross section are employed. The undercarriage is of the divided type, with each wheel in a "trouser leg."

The second machine is a little two-seater light 'plane flying-boat with 120-h.p. Salmson engine. Described as intended for "Ecole, Tourisme, et Transport Postal," the LeO H. 18 has a square "box" boat hull of wood, with a single step. The cantilever monoplane wing is also of wood, and the engine is mounted on struts high above the hull, driving a "pusher" airscrew. The occupants sit side by side, and there is a large windscreen in front, while a hinged roof encloses the cockpit except for the sides, which are left open. The type is rather intriguing, and might be developed in England as a private owner's seaplane.

Morane-Saulnier.—The three machines exhibited on this stand are all of the well-known M.S. type, *i.e.*, parasol monoplanes. They include a type 130 Et2 (transition type training), a 140 with wire-braced wing, and a Mo.S. 121 C1 single-seater fighter, with 400-h.p. Hispano-Suiza engine. The latter type has the front portion of its fuselage covered with aluminium sheet in the form of narrow channels, after the fashion of the Breguet machines.

Mureaux (*Ateliers des Mureaux*).—Of the two machines shown on this stand, one is a two-seater fighter, the M.4 C.2, which has a water-cooled Salmson engine almost entirely cowled-in, with the exception of the valve gear on top of the cylinders. This machine is a strut-braced monoplane, and was—if we remember correctly—shown at the last Paris Salon. The wheels are of wide track, and are carried in frames rigidly braced to the fuselage and wing respectively, the springing being between the wheels and their frames. The latter are enclosed in fairings.

The second machine, the title of which is M.B. 35, looks uncommonly like the little Marcel Besson submarine scout shown at the last Paris Exhibition, and the letters M.B. indicate that it may be the same. It is a low-wing monoplane submarine scout, and a placard states that it is used on the cruisers *Jeanne d'Arc*, *La Motte-Piquet*, *Duguay-Trouin*, and *Jules Michelet*, so that it is being used on surface craft as well. Wings and undercarriage are attached by quick-release devices for rapid dismantling and erecting.

Nieuport-Delage (*Nieuport-Astra*).—The metal-covered fuselage of a large twin-engined machine is exhibited, and it is stated that this has passed the static loading tests. Very deep wing roots spring from the sides of the fuselage and carry mountings for two radial engines. At the points where the engine plates occur, struts run downwards to two very large duralumin floats, so that obviously the machine is to be a seaplane. Beyond that no information is available.

The second machine is more orthodox, but if anything more interesting. It is a single-seater fighter of the well-known Nieuport-Delage sesquiplane type, but the wooden *monocoque* fuselage has been replaced by one of all-metal construction. Naturally, we have no figures available relating to weight and strength, but in appearance, at least, the new metal fuselage is worth a close inspection. Of almost perfect streamline form, the sections at any point are given by hoops of very shallow U-section. Stringers of plain channel section run through from end to end, and are bolted to the U-section formers. Riveted to the edges of the channel section stringers are the "planks," which are strips of duralumin, overlapping each other on the channel stringers. The interior is beautifully free from obstructions, and the construction has an appearance of simplicity which is probably somewhat misleading. Actually, owing to the fact that the fuselage is of streamline form, it must be necessary to get the curvature across the "planks" by panel beating, unless what appears a smooth oval section is in reality a polygon.

Henry Potez.—This constructor, whose products have generally had a habit of hiding very good qualities under rather ordinary exteriors, breaks new ground at the present show with two machines of somewhat unusual, although by no means "freakish," design. The Potez 35 is a twin-engined high-wing monoplane night bomber, fitted with two 450 h.p. Renault engines. Like so many modern French machines it is arranged *en conduite interieure*, and appears roomy and comfortable for the work to be done on board during a night raid.

The Potez 32 is a commercial monoplane of the "feeder line" type, with seating accommodation for four passengers. Like the large machine, it has the cockpit enclosed in front of the wing. The fuselage is finished as a "Weyman body," and the machine altogether looks very ship-shape. The engine is a Salmson air-cooled.

S.E.C.M. (*Société d'Emboutissage et de Constructions Mecaniques*).—The larger of the two machines shown is a type Amiot 122 B.P.3 with Lorraine-Dietrich 650 h.p. "broad arrow" engine. It is a long-distance bomber with three cockpits: pilots' in front, just under the cut-out in the trail-edge; gunner's farther aft, slightly raised and carrying a Scarff gun ring; far back in the fuselage a third, equipped with windscreen. The armament includes two bombs under the fuselage aft of the rear chassis struts: one under the nose of the fuselage, and one under each lower wing. The machine is of all-metal construction.

An interesting feature of the second machine, single-seater fighter with Hispano engine, is the arrangement of the petrol tank. This is built up as a very short lower 'plane of fairly thick section, with a petrol gauge in the top surface on the port side and the filler cap on the starboard. The machine itself is a strut-braced monoplane, the struts being arranged as Vees.

Wibault.—Although typical Michel Wibault machines in their whole conception, the two machines shown this year appear more refined than previous models, the slender fuselages, better lines and general "cleanness" seeming to indicate that better shapes are now obtained without sacrificing the original simplicity. As the machines are exhibited in a finished state, and, moreover, have metal covering, one can see but little of the detail work, but it is likely that this does not differ materially from older models. One machine, the Wib. 121, is a two-seater fighter with Hispano engine, while the other, the Wib. 170, is a single-seater fighter similar in a general way, but with the sides of its fuselage slightly curved.

PARIS SHOW DETAILS NEXT WEEK

IN this issue of FLIGHT there has not been the time, nor has space permitted, to include more than a very brief stand-to-stand "catalogue" of the aircraft exhibited, some 40 in all. The information given should, however, be sufficient to convey a fairly good idea of what there is to be seen in the Grand Palais this year.

In next week's issue we hope to go into rather more detail concerning such machines as appear to possess features, either in design or construction, of special interest to our readers.

These machines will be illustrated by photographs, and some of their constructional details by sketches.

THE "BRISTOL" EXHIBITS

THE Bristol Aeroplane Co., Ltd., is exceptionally well represented at this year's Paris Aero Show. Not only is a very full series of engines exhibited, but a complete "Bristol" aircraft as well. This is a single-seater fighter of very taking appearance and all-metal construction, and is obviously related to the Bristol "Bulldog" which made its appearance at the R.A.F. Display last week at Hendon, where it aroused very favourable comment. The manner of exhibiting the machine is one which was, we believe, "invented" by one Sergeant Turner at the Agricultural Hall, Islington, during the war, when captured enemy aircraft were so exhibited. It consists in "stripping" the machine to the centre line, so that when viewing it from one side one obtains an impression of the machine's lines and general appearance, and from the other all the constructional details can be examined with the greatest facility. It would be difficult to imagine a better way of showing an aircraft, provided one really wishes people to see it. There are, of course, cases where it is kinder to the constructor to cover up as much as possible!

In the Bristol single-seater fighter Great Britain has a worthy representative at the Paris Show. The machine incorporates some of the very latest forms of construction, making extensive use of corrugated sections formed from flat steel strip, a form of metal construction upon which a vast amount of work has been done in England, and in which Great Britain holds an unchallenged position. Other nations may have gone farther with welded construction, or have developed forms of duralumin construction that equal ours, but in the steel strip form of metal work we need fear comparison with no one. Consequently it is small wonder that from the moment the doors of the Grand Palais were opened, the Bristol stand was a centre of attraction for the more discerning visitors.

The "Bristol" single-seater fighter is a very fine example of modern British aircraft, and it is doubtful whether, at any Paris Aero Show held since the war, so up-to-date a British service machine has ever been exhibited. With a performance which is quite remarkabe, the new machine represents the latest ideas in both aerodynamic and structural design, and thus the machine well merits the closest inspection. Not the least interesting feature is the way in which performance is maintained at altitude. For example, at 20,000 ft. (6,100 m.) the speed is 172 m.p.h. (277 km./h.), while that altitude is reached in the astonishingly short time of 12 mins. Obviously, we have here a machine which is a good deal out of the ordinary in the matter of performance.

THE BRISTOL SINGLE-SEATER FIGHTER, BRISTOL "JUPITER" ENGINE: Three-quarter front view.

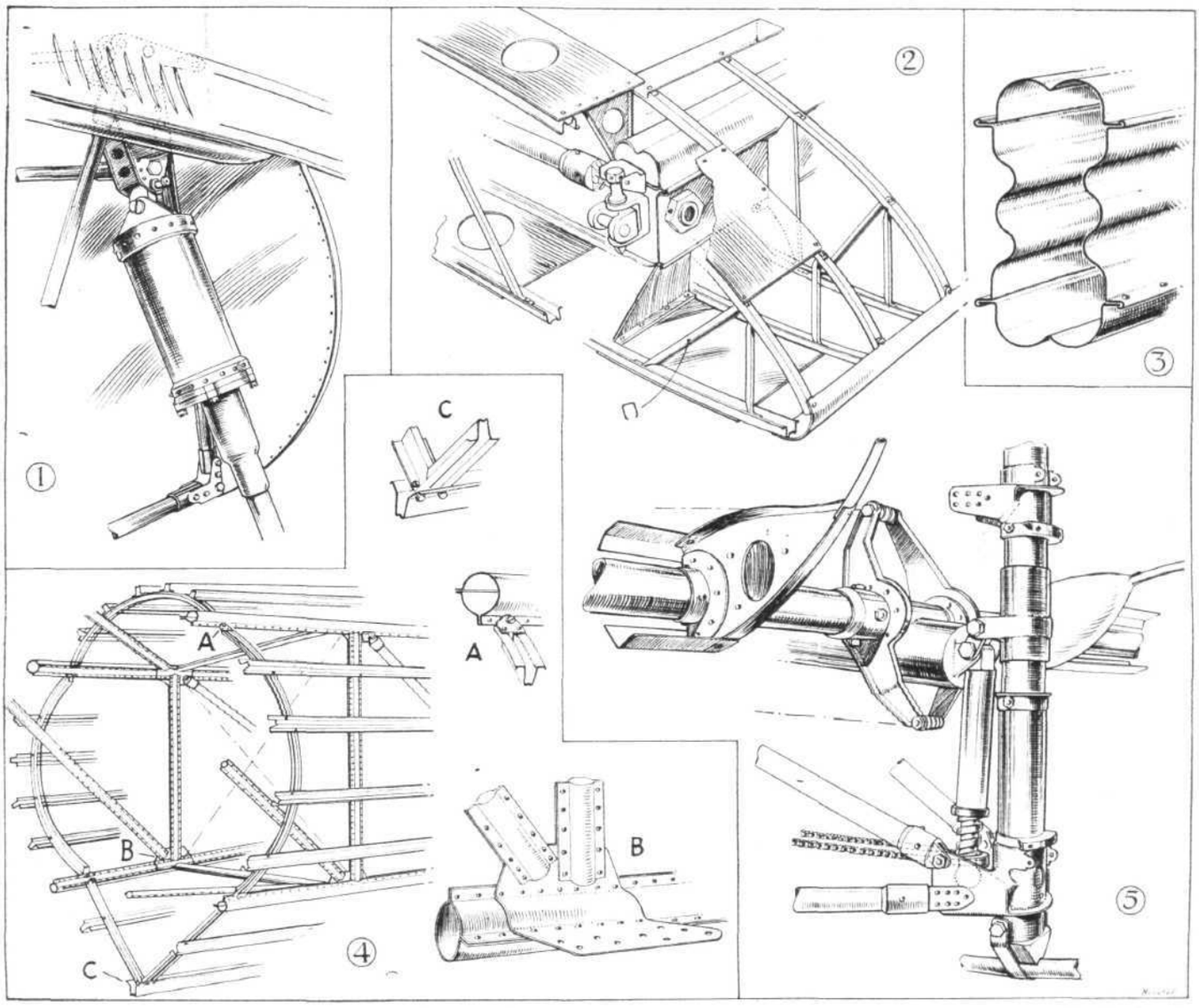
THE BRISTOL SINGLE-SEATER FIGHTER, BRISTOL "JUPITER" ENGINE: Three-quarter rear view.

Features in the design which make for aerodynamic efficiency are a carefully streamlined fuselage, with the engine neatly faired into it, a biplane wing arrangement in which the top plane is of greater span and chord than the lower: simple single-bay wing bracing, and generally a careful suppression of all causes of avoidable resistance.

In designing the machine a great deal of attention was paid to the subject of providing the pilot with a good view, as evidenced by the high position in relation to the top plane, whose trailing edge is cut away in the centre, and the centre-section itself made of thinner profile. The lower wing is of smaller chord, and in addition the trailing edge is cut away near the fuselage to give a downward view. Finally, the ground also the machine is very manœuvrable, partly on account of the attachment of the oleo legs to the top instead of to the bottom longerons, thus preventing rolling. The tail skid swivels.

Accessibility of all equipment, engine accessories, etc., has been particularly studied, quickly-detachable doors being provided. The wireless apparatus is fitted complete in a crate which slides out through a door in the side.

The military load includes pilot, parachute, two Vickers guns and 1,200 rounds of ammunition, C.C. gear for the guns, gun sights, oxygen and electrical equipment, instruments and wireless apparatus. The average total weight of the military load is 528 lb. (240 kg.).



["FLIGHT" *Copyright Sketches*

SOME CONSTRUCTIONAL DETAILS OF THE BRISTOL SINGLE-SEATER FIGHTER: 1, Attachment of the oleo undercarriage leg to top longeron. 2, A wing root, showing metal construction and form of attachment. The spar section shown in 3 is a recent development and depends mainly on the grip of the curled edges for locking flanges to webs, the number of rivets used being very small. 4, A general view of the construction of the rear portion of the fuselage, with details shown enlarged at A, B and C. The somewhat unusual trimming arrangement for the cantilever tail plane is illustrated in 5.

degree of stagger is such that the pilot can look over the lower leading edge at a very useful angle, and lastly, the fuselage deck slopes from the wind screen down to the engine, so that the view for landing is also very good.

Manœuvrability is another essential quality in a fighter, and the "Bristol" single-seater fighter is reported to be extremely manœuvrable without being at all unstable. The ailerons, fitted to the top plane only, are provided with the, by now, well-known Bristol-Frise type of balance, which does not impose a torque on the aileron as does a horn balance, while at the same time they introduce but small yawing moments. The rudder and elevator have a form of shielded balance which gives light control loads at all speeds. On the

Constructional Features

As already mentioned, the machine is built entirely of metal, and more specifically of steel, as regards the more highly-stressed members. Duralumin and aluminium are used for fairings, doors, etc.

Broadly speaking, two forms of construction are employed in the fuselage. The forward portion, which carries the engine, pilot and equipment, is built up of circular-section steel tubes forming longerons and struts. The joints between these are in the form of flitch plates with bolts passing through the tubes, the ends of which are provided with cylindrical sleeve pieces on to which are soldered flat-faced washers. The rear portion, from the cockpit back to the tail, is built

in the form of a Warren girder, the longerons and struts being formed from flat steel strip into circular sections with projecting flanges for external riveting. Outside the main structure are added light hoops and stringers which carry the fabric and bring the square section up to a rounded form.

The undercarriage is a plain Vee type, but is unusual in that the telescopic (front) legs are attached not to the lower longerons as is usually done, but to the top longerons. The rear struts are attached at their upper ends to the spar of the bottom centre-section. The shock-absorbing medium is oil, and compression rubbers, the first 2½ in. of travel being taken on the oil only, the remaining 4½ in. of travel on the rubbers contained in the top container.

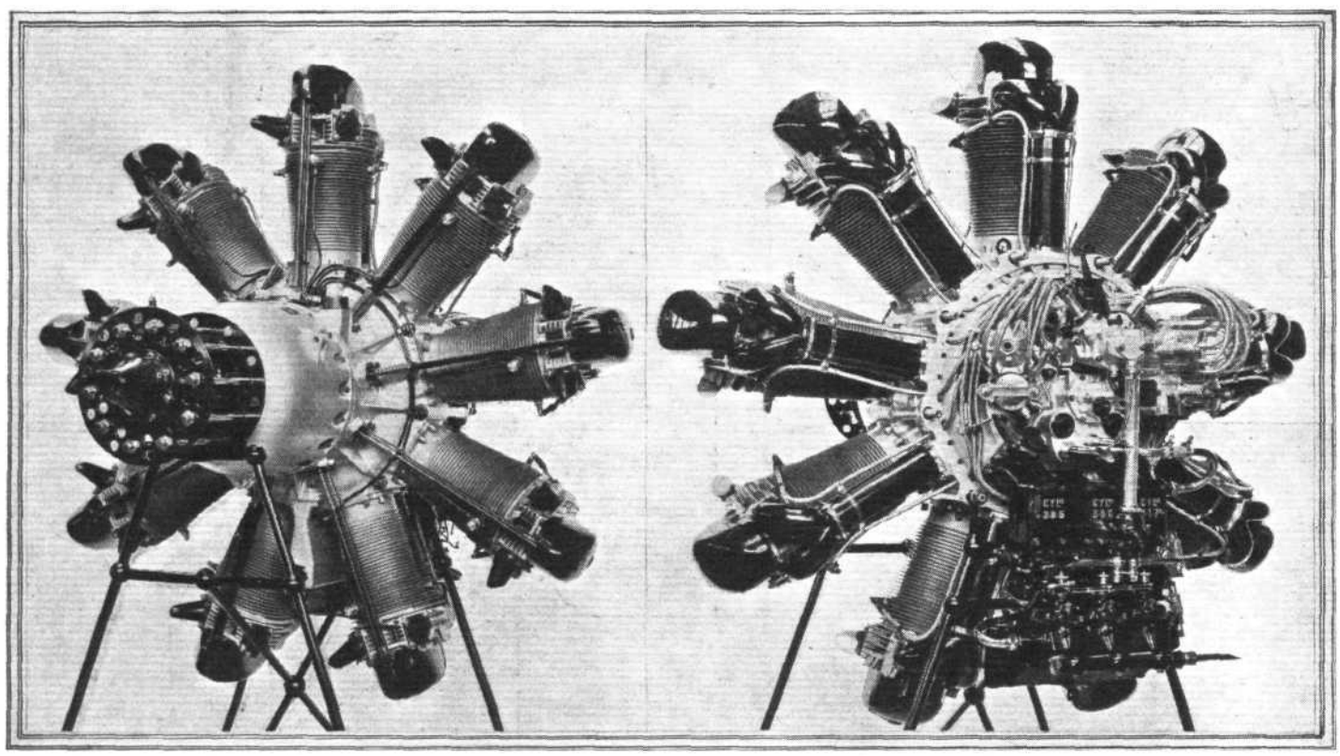
Like the fuselage the wings are of all-metal construction, with the exception of the fabric covering. They are of normal two-spar type, the spars being made from flat steel strip, rolled and drawn to the final section, and the webs and flanges together forming a box-section whose separate members are joined by riveting. The drag bracing struts are circular-section steel tubes, and in the outer bays these pass through both spars, extending aft beyond the rear spar to form supports for the hinges of the Bristol-Frise ailerons. The wing ribs are high-tensile steel channels.

The cowling of the engine has been well thought out, and there are front and rear fairings to each cylinder which, with the aluminium "helmets" fitted over the valve gear of each cylinder, reduce the drag of the projecting cylinder heads to a minimum consistent with sufficient cooling.

The main dimensions of the "Bristol" single-seater fighter are: Wing span, 33 ft. 10 in. (10·32 m.); wing area, 307·15 sq. ft. (28·55 m².); length o.a., 24 ft. 10 in. (7·6 m.). The weight, empty, is 1,990 lb. (905 kg.). Fuel and oil, 607 lb. (276 kg.); military load, 528 lb. (240 kg.). Total loaded weight, 3,125 lb. (1,421 kg.). Wing loading, 10·17 lb./sq. ft. (49·8 kg./m.²). Very full performance figures will be found in the specification on page 541.

THE BRISTOL ENGINES

The Bristol Aeroplane Co., Ltd., appears always to be unlucky in the allocation of stands. This year their engine stand, although adjoining the machine stand, is under the gallery where the light is very poor, and where consequently justice is scarcely done to the splendidly finished engines, which for sheer workmanship and finish ought to have been placed right in the middle of the Salon within sight of everyone. Nevertheless the reputation of the "Jupiter" is such



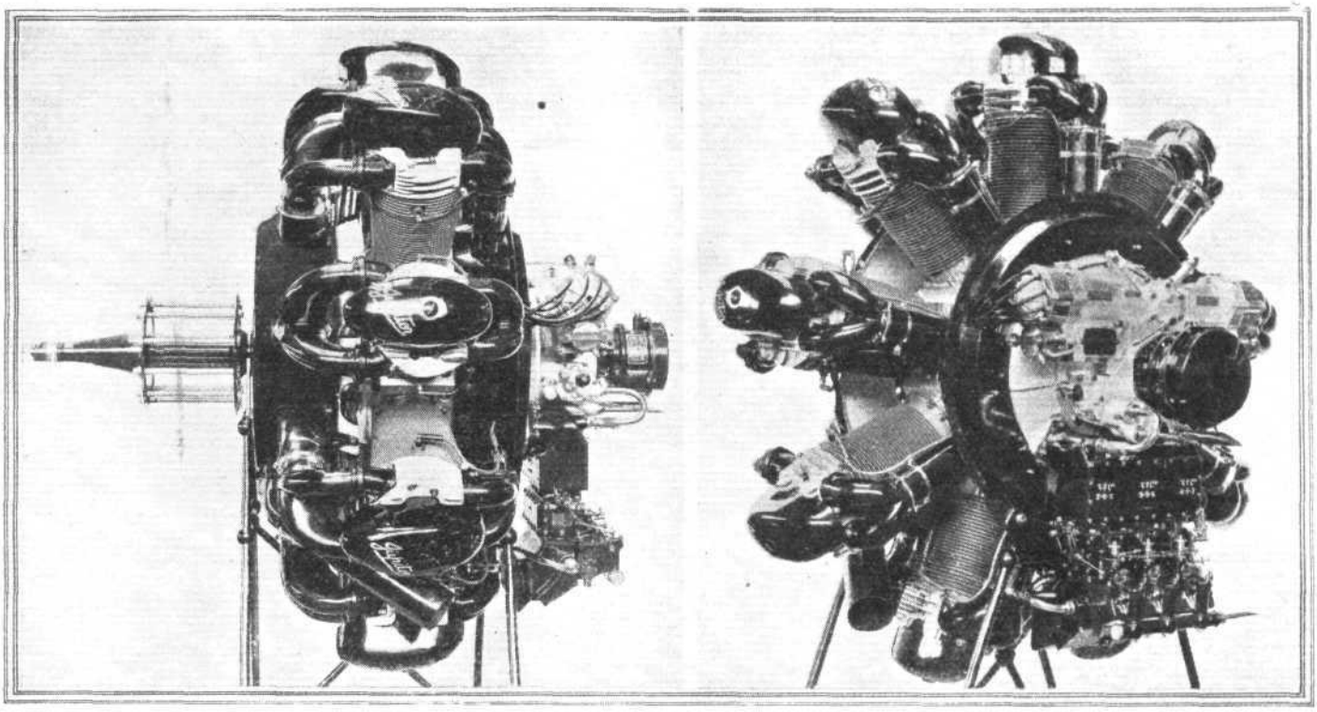
THE GEARED BRISTOL "JUPITER VIII": Three-quarter front and three-quarter rear views.

The controls are of normal type as regards their action and general disposition, but special provision has been made in the case of the foot bar for the rudder control for adjustment to suit various pilots. The seat has a neat adjustment for height, by means of which the pilot can raise and lower himself within fairly wide limits, according to whether he wishes to be well screened from the wind, such as for a prolonged flight, or to have an unobstructed view either for fighting or for landing, etc.

The petrol system of the "Bristol" single-seater fighter is that which is now almost universal in Great Britain, *i.e.* with two tanks in the top plane, giving direct gravity feed to the engine. On each side is a tank, built into the wing, of 35 gallons capacity, and gauges are provided which can be read from the cockpit. The oil tank is suspended from the lower longerons, just aft of the fireproof bulkhead, and is shaped to conform to the fairing lines. The tank incorporates a neat oil-cooling device.

The Bristol "Jupiter" engine is mounted on a rectangular plate of sheet steel with flanged-over edges. Steel channel pieces are riveted to the back of the engine plate in order to reinforce the corners. The plate is anchored to the fuselage by four steel tubes, whose forward ends are riveted to the corners of the engine plate, while the rear ends are bolted to the fuselage joints by tapered bolts.

that large numbers of visitors make their way to the back to examine in detail the four engines exhibited. These are: the "Jupiter VI A," the "Jupiter VII" the "Jupiter VIII," and the "Titan." The series VI is, as is well known, the direct-drive engine, the letter A in this case indicating high compression. The series VII is the supercharged engine, *i.e.*, fitted with a mechanically driven blower or "booster," which provides a certain degree of supercharging that enables the engine to give its full power at 12,000 ft. The series VIII is the geared version, while the "Titan" is a five-cylinder radial utilising a large number of standard "Jupiter" parts. The "Jupiter VII" is included among the engine specifications published elsewhere this week (*see* p. 566), and in the following notes we will therefore refer mainly to the three other types. The Bristol engines will already be so well known, that a detailed description is not needed, even did our space permit of giving one. But a few refinements are found on the exhibition engines which have not hitherto been in general service, and a reference to which may, therefore, be of interest. The arrangement of the auxiliaries on the back of the engine has been altered in the series VI A. and "Titan" engines. The magnetos, instead of being placed at an angle diagonally, are placed, in the new arrangement, at right angles to the crankshaft, as are also the petrol pumps. In this way space has become available centrally for an

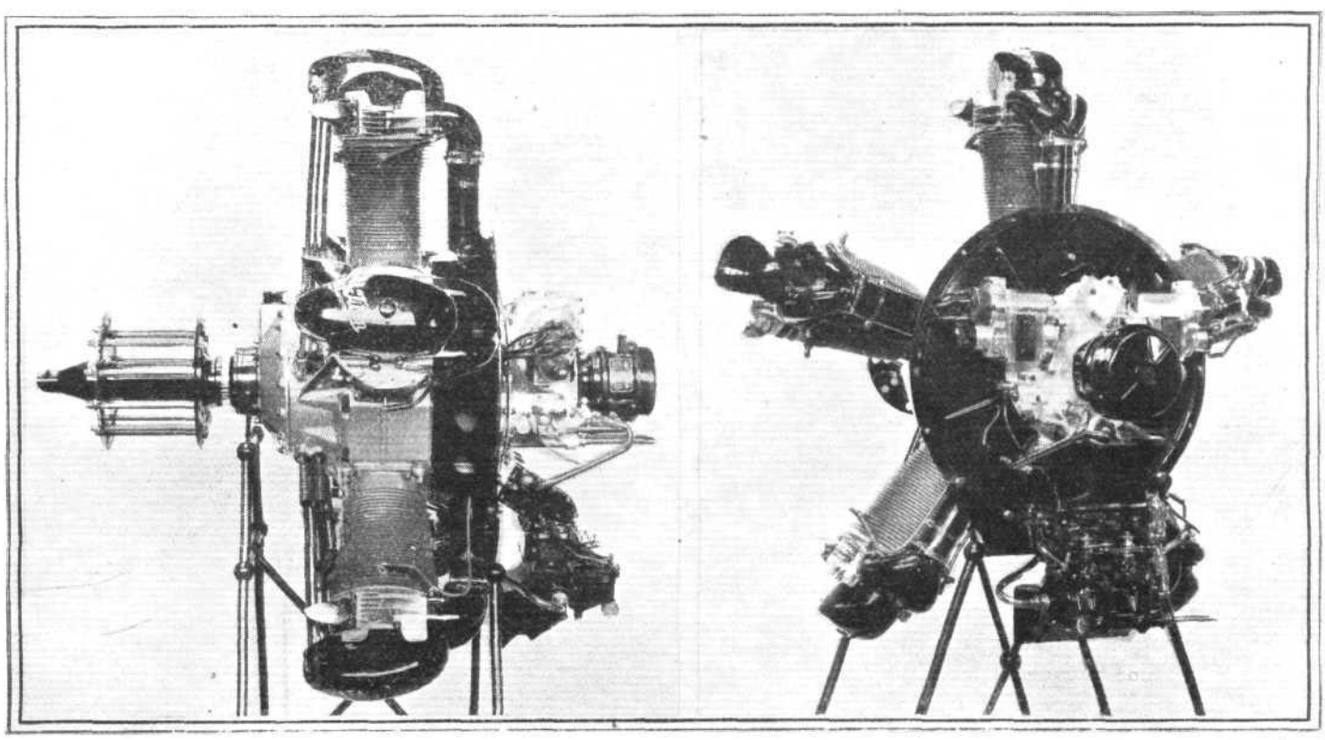


THE DIRECT-DRIVE BRISTOL "JUPITER VI A": Side and three-quarter rear views. Note helmets over the valve rocker gear. Also the special exhaust-collector ring.

"Eclipse" impulse starter, the hand crank for which is inserted from one side. Of the exhibition engines the new arrangement is shown on the series VI A. and on the "Titan." Of other refinements, mention may be made of the mounting of the valve rockers on ball bearings, so that the period between oilings has now been increased to about 100 hours. The contact between rocker and valve stem is now by a spherical steel ball, and above this is inserted a small felt pad soaked in oil. This ensures lubrication of this important part, and will run for long periods. Renewal of the oil pad is done in a few moments. Another new feature of the Bristol engines is the enclosure of the valve rockers in "helmets" to protect them from dust and to prevent any slight oil leaking past the valves from being blown back over the machine. These helmets are secured by a single central bolt and nut, and located and prevented from turning by two small dowels.

Following are the leading particulars of the "Jupiter VI A.": Bore, 5·75 in. (146 mm.); stroke, 7·5 in. (190 mm.); volume, 1,753 cub. in. (28·7 litres); normal speed, 1,700 r.p.m.; maximum speed, 1,870 r.p.m.; rated power at normal speed, 415 at 5,000 ft. (1,525 m.); rated power at maximum speed, 455 at 5,000 ft. (1,525 m.); compression ratio, 6·3 to 1; standard weight bare, 720 lbs. (327 kg.).

The "Jupiter VIII" has the same bore and stroke, but the normal speed is 2,000 r.p.m. and the maximum speed 2,200 r.p.m. The compression ratio is 5·8 to 1; rated power at normal speed, at 4,000 ft. (1,220 m.) 440 b.h.p.; rated power at maximum speed, at 4,000 ft. 480 b.h.p.



THE BRISTOL "TITAN": Made up of five "Jupiter" cylinders and pistons, etc., this provides a power unit of medium power and having very few parts.

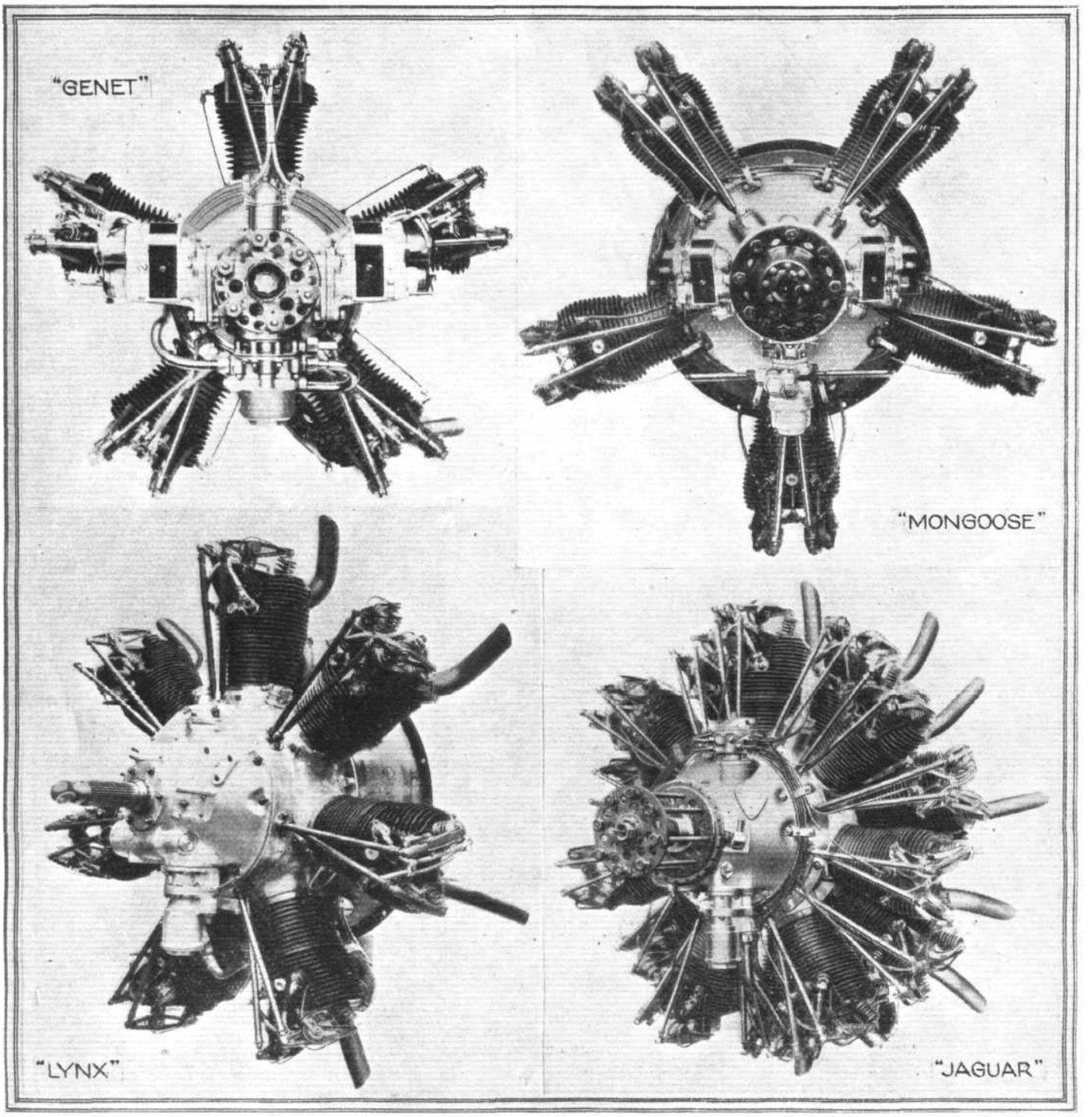
As already mentioned, the Bristol "Titan" is a five-cylinder radial employing in the main standard "Jupiter" parts. Obviously the crankcase is different, while the master connecting rod is also of necessity different from that of the 9-cylinder engines. But all main parts such as cylinders, pistons, articulated connecting rods, crankshaft, etc., are interchangeable with those of the 'Jupiter," a fact which may often be of great advantage from the point of view of spares. The famous Bristol three-start spiral induction system cannot, of course, be employed on a 5-cylinder engine, and therefore an engine-driven mixture distributor fan has been embodied. This is not a super-charger in the sense that it forces a greater quantity of fuel in than would be naturally aspirated, while the "booster" of the series VII, being run at many times the engine speed, does do so. In the "Titan" the fan runs at engine speed and merely ensures good mixture and a full cylinder charge.

The main particulars of the Bristol "Titan" are as follows: Bore, 5·75 in. (146 mm.); stroke, 6·5 in. (165 mm.) total swept volume, 842 cub. in. (13·8 litres); compression ratio, 5 to 1; rated normal power, 200 b.h.p. at 1,700 r.p.m.; maximum power, 220 b.h.p. at 1,870 r.p.m.; weight dry, 500 lbs. (227 kgs.); fuel consumption, 13 galls. per hour; oil consumption, 2 pints per hour. A service type with higher compression ratio (5·3 to 1) is also produced, developing 220 h.p. at 1,700 r.p.m. and a maximum of 240 h.p. at 1,870 r.p.m.

THE ARMSTRONG-SIDDELEY ENGINES

ARMSTRONG-SIDDELEY MOTORS, LTD., are exhibiting their complete range of radial air-cooled engines, *i.e.*, the "Genet," the "Mongoose," the "Lynx" and the "Jaguar." Mounted on exhibition stands and with their "show finish," the four engines look remarkably well, and compare well with those of other firms in the matter of finish and workmanship. The position in the show is quite a good one, although under the gallery; and the four engines, forming a whole "family" as it were, never fail to attract the visitors.

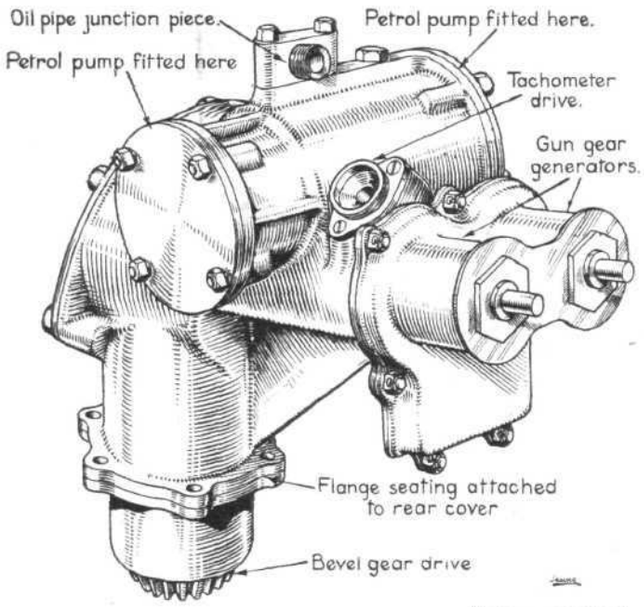
In view of the prominence which the two "elder members" of the family have attained, it is scarcely necessary to describe them in detail. It will suffice if we recall that the



THE FOUR ARMSTRONG-SIDDELEY ENGINES AT THE PARIS SHOW: Covering a range from 80 b.h.p. to more than 400 b.h.p., these four power units should supply the requirements of any imaginable type of aircraft.

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

"Jaguar" and the "Lynx" have the same cylinders, pistons, connecting rods, etc., so that a firm or nation using one type can add the other without needing to increase to any material extent the number of spares carried. The "Jaguar" is a 14-cylinder. two-bank radial, with the cylinders in one bank staggered in relation to those in the other so as to assist cooling. The cylinders have barrels machined from a steel forging, and are so designed that their upper ends butt up against a shoulder in the aluminium cylinder head and thus form gas-tight joints. The barrel is secured to the head by a lock nut, which appears externally as a radiating fin. The pistons are of aluminium alloy and



["FLIGHT" *Sketch*

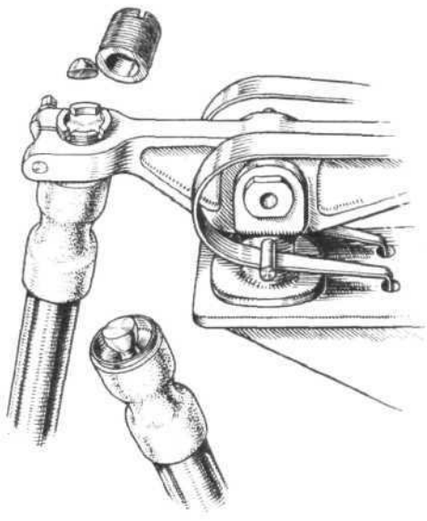
The Armstrong-Siddeley "Jaguar": Sketch showing the new auxiliary drive unit, which is mounted on the back of the engine and takes the place of the drives placed on the front of the engine in earlier models.

have two compression rings and two scraper rings. In both the "Jaguar" and the "Lynx" there is a master connecting rod with six auxiliary rods, but in the larger engine there are of course two sets of these, working on two cranks set at 180°.

The leading particulars of the "Jaguar" are as follows: Bore, 5 in. (127 m.); stroke, 5·5 in. (140 mm.); swept volume, 1,512 cub. in. (24·781 litres). The power varies according to the series, from 385 b.h.p. to 425 b.h.p. at a normal speed of 1,700 r.p.m. The petrol consumption is 0·56 pints per h.p. per hour, and the oil consumption 0·025 pts./h.p./hr. The weight of the engine dry is 770 lbs. (348 kg.).

The leading particulars of the "Lynx" are: Bore, 5 in. (127 mm.); stroke, 5·5 in. (140 mm.); swept volume, 756 cub. in. (12·395 litres). The power varies, according to series, from 200 to 225 b.h.p. at a normal speed of 1,900 r.p.m. The petrol consumption is 0·56 pt./h.p./hr., and the oil consumption 0·925 pt./h.p./hr. The weight is 480 lbs. (217 kg.).

The "Mongoose" is a medium-power five-cylinder radial air-cooled engine of similar general design to the successful "Jaguar" and "Lynx," and having the same bore and stroke, *i.e.*, 5 in. and 5·5 in. respectively. With only five cylinders the gaps between them are large, and not only good cooling but an excellent view is obtained. The engine is of a power which should find many uses, and fills in the gap between the "Lynx" on one hand and the "Genet" on the other. With a volume of 540 cub. in.



["FLIGHT" *Sketch*

A recent refinement: Increased durability is ensured by this new arrangement of the push rod/rocker arm contact on the Armstrong-Siddeley "Jaguar."

(8·85 litres) and a compression ratio of 5 to 1, the "Mongoose" develops 125 h.p. at the normal speed of 1,620 r.p.m. The petrol consumption is 0·58 pt./h.p./hr., and the oil consumption 0·025 pt./h.p./hr. The weight of the engine is 340 lbs. (153·8 kg.).

The "Genet" is, like the "Mongoose" a five-cylinder radial air-cooled engine, but it has smaller parts than those of the "Mongoose," with a bore of 4 in. (101·6 mm.) and a stroke of 4 in. (101·6 mm.). The volume is 251·2 cub. in. (4·14 litres), and the compression ratio 5·2 to 1. The "Genet" develops 80-88 h.p., and the normal speed is 2,200 r.p.m. The petrol consumption is 0·58 pt./h.p./hr., and the oil consumption 0·03 pt./h.p./hr. The weight of the engine is 176 lbs. (80 kg.)

"The Short Cut"—or the Slip and the Cup

IN the verses of "The Droning Hawk" on page 482 last week a "p" inadvertently appeared in the fifth line from the bottom of the first column instead of a "t," thereby befogging the sense, as will be seen by substituting "Cut" for "Cup."

Air Mail Service to Persia

THE Postmaster General announces that a through weekly air mail service has been established with Persia via Russia and is available for all classes of correspondence, except parcels, under the usual conditions. Time of posting at London Chief Office: 6 a.m. every Thursday. Time of transit: About five days to Teheran, eight days to Bushire. Special air fee (in addition to ordinary postage): 1*s.* 6*d.* per ounce. The existing services to Persia as shown in the Air Mail Leaflet (obtainable at or through any Post Office) remain unchanged.

Our Air Mail "Stamps"

THE Postmaster-General, replying to a question by Mr. Lansbury regarding the supply of stamps or labels for use on British air mails, stated in the House the other day that air mail "labels" were supplied to all large offices and to smaller offices at which there was a demand for them. He added he would arrange for the labels to be available in future at all offices, and that ordinary postage stamps were used to prepay the air mail fees. But, *why not* have special air mail stamps like other civilised nations?

Seaplane Rescued

AN R.A.F. seaplane, with Flight-Lieuts. A. Stevens and C. A. Turner, Air Mechanic Long and Wireless Operator Geddes on board, nearly foundered with its crew on June 30 off the Welsh coast. It left Pembroke Dock in the morning to take part in manœuvres at Walney Island, Barrow. Engine trouble developed and a forced landing was made in the sea 22 miles east of Bardsey Island. For 3½ hours it was buffeted about, and when about to founder a drifter, *Kittiwake*, appeared and took the crew on board. Three of the men were on one wing when sighted and the wireless operator was still in his cockpit.

R.A.F. Music in Canada

THE R.A.F band, under Flt.-Lieut. J. H. Amers, landed at Quebec on June 29 from England for the Canadian tour which commences at Vancouver shortly.

VISITORS FROM ITALY

ON Monday evening at the Savoy Hotel, upon the invitation of H.E. Gen. Italo Balbo, Italian Under-Secretary for Air, a number of guests attended to meet the Italian flying contingent, who flew over with Gen. Balbo to witness the great R.A.F. Display on Saturday.

Gen. Balbo, who presided, having given the toast of "The King of England," followed by that of "The King of Italy," in proposing the toast of "The Guests and British Aviation," said that next year, when he returned here for the Schneider Race, he would speak in English. He referred in very sympathetic terms to the tragedy of Gen. Guidoni's death, and to the loving memory which he had left behind him in this country. Referring to British aviation, he was greatly impressed with what he had seen. Aviation, he said, may be and certainly is a great war instrument, but it also was an instrument for great progression. He believed that aviation was founded on a great industrial problem, and nobody could say that Great Britain was not at the head of the industrial aviation of the world. This was clearly shown in Venice, and Italy did not begrudge it because after the competition their friendship was, if anything, better than ever. This year he and his flying contingent were here in larger numbers than last year, so that his people could see for themselves the great Hendon display. Their flying to England as they did also showed that there are no barriers between London and Rome, which can be done in one flight. He offered his sincere thanks for the great reception of himself and his compatriots at the aerodrome and during their various visits elsewhere, from which they had gained very great knowledge. They would return to their country with remembrances of their splendid reception, which he felt would bind the two countries still more together.

Capt. Acland, of Messrs. Vickers, Ltd., who spoke as Chairman of the S.B.A.C., associated the whole of the aeronautical movement in England with the sympathetic testimony to Gen. Guidoni's position in this country. His Excellency Gen. Balbo had, he said, given a good review of aviation in this country, which relieved him from saying very much. It would, he expected, interest his Italian friends, however, to hear something of the Schneider Cup of next year, so far as he knew it. But he feared that for 1929 it was a closed book, inasmuch as, firstly, they did not know the place where the race would be held; secondly, they did not know the date; thirdly, they did not know what machines they were going to enter; fourthly, they did not know what engines they were going to use; and last, although not least, they did not know who their pilots would be. The present was a very good occasion to elicit the help of their Italian friends upon these points, who would be able to force the conclusions to which they had not so far been able to arrive. Having got those answers, the aeronautical bodies would look forward to welcoming them here and give them a reception of which they would be worthy. This, however, was a great problem, having regard to the splendid hospitality which was extended to the British visitors at Venice last year. He concluded by offering congratulation to Italy for Bernardi, their countryman, having obtained the

["FLIGHT" *Copyright*

A DISTINGUISHED VISITOR: General Balbo, Under-Secretary for Air in Italy, and Capt. Brack-Papa being greeted by Air Vice-Marshal Scarlett (left) after the flight from Italy. The General and his retinue came to England for the purpose of visiting the R.A.F. Display at Hendon.

["FLIGHT" *Copyright*

The Italian Fiat monoplanes (Fiat engines) on their arrival at Hornchurch on June 28 after the non-stop flight from Italy, led by General Balbo, Under-Secretary for Air, Italy.

seaplane speed record, a win which they applauded sincerely, second only to one of our own people having secured it. He also expressed admiration for the recent great flight of 61 Italian machines round the Mediterranean. He would look forward to the opening of a regular Rome-London service, and on behalf of the industry he offered them their great appreciation of the opportunity of meeting his compatriots.

Col. the Master of Sempill, on behalf of the other aeronautical bodies, thanked Gen. Balbo for the opportunity of meeting them that evening. The gathering was the more appreciated as Great Britain had been enabled to know the cream of Italian aviation. In regard to the late Gen. Guidoni, he was an officer with most wonderful and unique experience, and particularly was his loss felt at the Royal Aeronautical Society, for he had never missed attending a technical meeting of that body. They still had memories of the magnificent hospitality given them at the Venice meeting, and they could hardly hope to equal this, but next year they would endeavour to give them a reception as worthy of them as it was possible.

In conclusion, he called for three hearty cheers for Gen. Balbo and the Italian aviators.

Amongst other invited guests present were Dr. Oreste Rizzini, Ing. Anthony Lago, Prof. Camillo Pellizzi, Com. De Probizer, Dr. Gimpel, Nob. Renato Prunas, Gen.. Lombard, Col. Bolognesi, Lt.-Col. Todeschini, Lt.-Col. Ajmone Cat, Lt.-Col. Pinna, Lt.-Col. Fougier, Lt.-Col. Ranza, Maj. Perino, Maj. Sacchi, Maj. Lordi, Maj. de Bernardi, Maj. Martelli, Maj. Mecozzi, Maj. Briganti, Capt. Brack-Papa, Capt. Menghi, Capt. Granzarolo, Capt. Gaeta, Capt. Orlando, Capt. Liberati, Capt. Baldi, Capt. Guazzetti, Capt. Baudoin, Lt. Di Robilant, Lt. Cecconi, Lt. Porru-Locci, Dr. Bojano, Dr. Cavara, Dr. Quadrone, Dr. Intaglietti, Dr. Carlassarre, Dr. Contini, Dr. Carli, Dr. Palandri, Dr. Giacomantonio, Dr. Cantalamessa, Dr. Camagna, Dr. Govoni, Dr. Nosari, Marchese Patrizi, Dr. Guiseppe Fedullo, Lt. Sacerdoti, Dr. Tasselli, Gen. Rodolfo Verduzio, Col. Coppi, Dr. Rampagni, Signori A. Bettini, C. A. Straneo, G. Dell'Oro, G. Massone, G. B. Ceccato, G. Guido Crolla, Defacci Negrati, G. de Grossi, Abbiati, Sovrani, G. Palliccia, Mazzotti, Commander H. E. Perrin, Commander J. Bird, Col. Ercole, Col. Coop, Group-Capt. C. R. S. Bradley, Flight-Lieut. MacDonald, Messrs. F. Handley Page, J. D. Siddeley, G. T. Vane, Stanley Spooner, J. L. Pritchard, C. G. Grey, F. W. Emett, R. F. Church.

LUNCHEON TO THE "BREMEN" CREW

THE Royal Aeronautical Society, Royal Aero Club, Air League of the British Empire and Society of British Aircraft Constructors gave a luncheon at the Savoy Hotel on July 2 to Baron Von Huenefeld, Capt. Hermann Koehl and Commandant James Fitzmaurice, the three airmen who made the first flight from east to west across the North Atlantic in a heavier-than-air machine, the Junkers "Bremen." They had arrived at Croydon by air in a sister machine, and were late owing to head winds prevailing all the time.

The Chairman, Lord Thomson, said that they were fortunate to welcome three gallant gentlemen who had displayed the urge to achieve and the unconquerable spirit that distinguished the better type from the beasts who perish. He thought that the first air passengers on the future London to New York air line would be haunted by the ghosts of the pioneers, and would remember those who had blazed the trail. Baron Von Huenefeld, he continued, had shown enterprise and vision, and was a worthy sportsman. He believed the exploit could be accomplished, had staked his money and life, and won his bet.

Of Capt. Koehl, it was difficult to speak with moderation. He had piloted their machine for thirty hours or more, and at the end of a long test, physical, mental and moral, he put his machine down on thin ice which went through when they next tried to take off again. That was artistic airmanship.

Of Commandant Fitzmaurice, he thought he could describe him as the mascot to the expedition. He had gone west quicker than any other Irishman before. He was a gallant gentleman because of that ideal, and he wished him luck. In the name of the Royal Aeronautical Society, Royal Aero Club, Air League of the British Empire and Society of British Aircraft Constructors, he congratulated the gallant gentlemen on their presence there, and wished them long years and prosperity, but not repose and ease.

Commandant Fitzmaurice then rose and gave a brief and direct account of his flight, beginning with the criticism that they had received before the venture. He said that their flight might be regarded as a stunt, but it had been thoroughly organised. It was a sporting effort, perhaps, because they had only used one engine. The reason for that however, was lack of money to provide three engines. But there was the thoroughness of the German people behind the flight. Capt. Koehl was a man with long flying experience. They knew that with any degree of luck they could get over. A twenty-four hour weather report given them by Capt, Entwhistle of the Air Ministry had proved very accurate. The fog bank of Newfoundland, which engulfed them at the end, could not be forecasted, he explained, as it came up in five minutes. For two-thirds of the flight they flew at a height of between 50 and 100 ft., and during the day Capt. Koehl and he shared the piloting for intervals of three hours.

Their greatest mistake, he said, was in not taking wireless, for when they were about 400 miles from the other side, if a position could have been obtained by wireless the correct course could have been taken and New York reached the next morning after a flight down the coast. For it was discovered, after their ultimate landing in Labrador, that eight to ten hours' fuel was left in the tank. He mentioned the terrors of Labrador for the airmen, and utter impossibility of survival after a forced landing in most parts there.

In conclusion, he said that their experience had convinced him that an Atlantic air service was possible in the near future.

Capt. Koehl, who could only speak a few words of English, taught him during his brief acquaintance with Commandant Fitzmaurice, employed his limited vocabulary very pleasantly in thanking his hosts for the kind reception.

Baron Von Hueneveld also spoke very little English. He said that they were happy to be the successors of Nungesser, Coli and the other pioneers, and he was glad to come to the Motherland of sport and fairplay.

Amongst those present were :—Col. The Master of Sempill, Sir Charles Wakefield, Sir Sefton Brancker, Mr. Oswald Short, Mr. Handley Page, Capt. P. Acland, Lady Heath, Gen. Groves, the German Ambassador, Mr. Dulanty and Com. Perrin.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-Committee of the Fund was held at Iddesleigh House, on June 28. Mr. Walter S. Field was in the chair, and the other members of the committee present were :—Mrs. L. M. K. Pratt-Barlow, O.B.E., and Sqdr.-Ldr. Douglas Iron, O.B.E. The committee considered in all 17 cases and made grants to the amount of £196 12s. 6d. The next meeting was fixed for July 12, at 2.30 p.m.

Royal Air Force Flying Accidents

THE Air Ministry regrets to announce that as the result of a collision in the air at Upavon, between two Woodcock machines of No. 3 (Fighter) Squadron, Upavon, on June 5, Flying-Officer Douglas James Frederick McMillan and Flying-Officer Philip Cranswick, M.C., the pilots and sole occupants of their respective aircraft were killed.

As the result of an accident near Mosul to a Bristol "Fighter" machine of No. 6 (Army Co-operation) Squadron, Mosul, on June 8, 335654 Sergeant Alfred Joseph Garner, the pilot of the aircraft, and 158714, Sergeant William Frank Futcher were killed.

As the result of an accident at Shaibah, Iraq, to a D.H.9a machine of No. 84 (Bombing) Squadron, Shaibah, on June 12, 359131, Sergeant Francis George Bamford, the pilot of the aircraft, and 359418, A.C.1. Arthur Sidney Frost, were killed.

R.A.F. "Crack" Pilot Killed

FLIGHT-LIEUT. H. C. CALVEY and a R.A.F. aircraftsman were killed on June 1 at Clifton, Bedfordshire, when flying an Avro-Lynx. The former was a well-known aerobatic pilot, and often performed for the R.A.F. at air meetings.

THE ROYAL AIR FORCE

London Gazette, June 26, 1928

General Duties Branch

The following are granted temp. coms. as Flying Officers, on attachment for duty with R.A.F. (June 17) :—*Lieut., R.N.*—R. H. S. Roundell. *Sub.-Lieuts., R.N.*—P. W. Humphreys, B. H. M. Kendall.

The following Pilot Officers are promoted to rank of Flying Officer :—H. V. Forbes, R. C. Greenhalgh ; Jan. 14. A. P. de Woulfe Wytt, H. P. Hudson ; April 10. W. R. Baird ; May 25. W. C. Cooper, C. W. Dicken ; June 11. Pilot Officer on probation A. E. J. Pratt is confirmed in rank ; May 2.

The following Pilot Officers on probation relinquish their short service commns. on account of ill-health :—J. G. Walling ; June 23. R. E. S. M. Vinning ; June 27. The short service commns. of the following Pilot Officers on probation are terminated on cessation of duty ; June 27 :—D. A. Forbes, M. M. Freeman. The following Flying Officers are transfd. to Reserve, Class A :—N. J. Wiltshire ; June 17. C. L. Lowe, D.F.C. ; June 25.

Stores Branch

Flying Officer E. H. Broad is transfd. to Reserve, Class C ; June 20.

Medical Branch

Flying Officer J. Hill, M.B., is promoted to rank of Flight-Lieut. ; June 27. Flying Officer (Quartermaster) W. Gamblen is promoted to rank of Flight-Lieut. (Quartermaster) ; July 1.

Memorandum

The permission granted to 2nd Lieut. H. S. Greening to retain rank is withdrawn on conviction by the Civil Power ; May 24.

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

A. C. S. Irwin is granted commn. in Class A as Flying Officer on probation ; June 26. G. R. M. Garratt is granted a commn. in Class AA (ii) as Pilot Officer on probation ; June 14. Pilot Officer H. N. Miller is promoted to rank of Flying Officer ; June 21. Flying Officer H. C. Adams is transfd. from Class A to Class C ; June 8. Pilot Officer T. P. Jenkins relinquishes his commn. on completion of service ; May 22. The commn. of Pilot Officer on probation G. T. Clark is terminated on cessation of duty ; June 26.

Stores Branch

Sqdn.-Leader F. Rivers-Smith, M.B.E., relinquishes his commn. on completion of service and is permitted to retain his rank ; June 17.

AUXILIARY AIR FORCE

General Duties Branch

The following to be Pilot Officers :—*No. 601 (City of London) (Bombing) Squadron.*—E. A. Huntingdon-Whiteley ; June 7. *No. 605 (County of Warwick) (Bombing) Squadron.*—J. R. H. Baker ; June 14.

ROYAL AIR FORCE HALF-YEARLY PROMOTION LIST

THE Air Ministry announces :—

The undermentioned are promoted with effect from July 1, 1928 :—

General Duties Branch

Air Commodore to Air Vice-Marshal.—Frederick Crosby Halahan, C.M.G., C.B.E., D.S.O., M.V.O.

Group Captain to Air Commodore.—Frederick William Bowhill, C.M.G., D.S.O.

Wing Commanders to Group Captains.—Charles Dempster Breese, A.F.C. ; William Harold Primrose, D.F.C. ; Henry Richard Busteed, O.B.E., A.F.C. ; Arthur Sheridan Barratt, C.M.G., M.C. ; Joseph Ruscombe Wadham Smyth-Pigott, D.S.O. ; Ernest Leslie Gossage, D.S.O., M.C.

Squadron Leaders to Wing Commanders.—Lionel Thomas Nutcombe Gould, M.C. ; John Benjamin Graham, M.C., A.F.C. ; James McCrae, M.B.E. ; Gilbert Ware Murlis-Green, D.S.O., M.C. ; William Victor Strugnell, M.C. ; Patrick Alexander Ogilvie Leask ; Kenneth Caron Buss ; John Kilner Wells, A.F.C. ; John Claude Malcolm Lowe ; Frederick Sowrey, D.S.O., M.C., A.F.C.

Flight-Lieutenants to Squadron Leaders.—Edwin Cheere Emmett, M.C., D.F.C. ; Robert Stanley Aitken, M.C., A.F.C. ; Harry Augustus Smith, M.C. ; John Victor Read, M.B.E. ; Walter Edward George Bryant, M.B.E. ; Oliver Campbell Bryson, M.C., D.F.C., A.M. ; Benjamin James Silly, M.C., D.F.C. ; Charles Henry Awcock, O.B.E. ; Augustus Henry Orlebar, A.F.C. ; Percy Eric Maitland, A.F.C. ; Joseph Henry Green ; Bernard McEntegart ; Charles Ley King, M.C., D.F.C. ; Charles Roderick Carr, D.F.C., A.F.C.

Flying Officers to Flight Lieutenants.—Sidney James Bailey, James Silvester ; Henry Spear Sandiford ; Herbert Edward King ; James Noonan, D.S.M. ; Victor Croome ; Michael Sullivan Keogh, A.M. ; Joseph James Teasdale ; Patrick John Richardson King ; Charles Maurice Elton Gifford (Hon. Flight-Lieut.) ; John Edmund Lavard Drabble ; Henry Longfield Beatty ; Edward Hugh Markham David ; George Hedley Stainforth ; Robert Stiven (Hon. Flight-Lieut.) ; Edward Albert Sullock, A.F.C. ; John Gordon Murray ; John Harston ; Maurice Vavasour Ward ; Neill Charles Ogilvie-Forbes ; Miles Herbert Garnons-Williams ; Albert Wentworth Bates (Hon. Flight-Lieut.), Frank Hawker Wooliams ; Frank Cecil Farrington, M.C. ; Gordon Carruthers Shepherd ; George Noad-Carroll (Hon. Flight-Lieut.) ; Maurice Wiblin ; Cyril Bennet Greet ; Patrick John Antony Hume-Wright ; Robert Henry Seymour Spaight ; Bryan Vernon Reynolds ; Eric Victor Major (Hon. Flight-Lieut.) ; Freke William Wiseman-Clarke (Hon Flight-Lieut.) ; Alexander Harold James Howlett ; Leonard Kelly Barnes ; Douglas MacFadyen ; Walter Lloyd Dawson ; Victor Bruce Bennett ; Claude Bernard Raymond Pelly ; David Lindsay Gordon Bett ; Cecil Stanley Riccard ; Charles Edward Neville Guest ; Francis Ronald Downs Swain ; Frank Eric Watts ; Ernest Reynolds Maddox, M.C. ; Reginald Yarrow Eccles ; Reginald Vere Massey Odbert ; Donald James Steward (Hon. Flight-Lieut.) ; Wilfred Wynter-Morgan, M.C.

Captain R.M. Flying Officer, R.A.F., to be Flight Lieutenant.—Harry Melville Arbuthnot Day, A.M.

Lieutenants R.N., Flying Officers, R.A.F., to be Flight Lieutenants.—Robert Rule Graham ; Matthew Sausse Slattery.

Supplementary List

Flight Lieutenant to Squadron Leader.—George Stanley Reed, O.B.E.

Flying Officer to Flight Lieutenant.—Ernest James Howes.

Stores Branch

Wing Commander to Group Captain.—Charles Gainer Smith, O.B.E.

Squadron Leader to Wing Commander.—William Millett.

Flight Lieutenants to Squadron Leaders.—Wilfrid Charles Green, M.C. Frederick Ralph Wilkins ; William Richard Percy Allen ; Thomas Edward Drowley.

Flying Officers to Flight Lieutenants.—William Joseph Cleasby ; Charles Edward Tidy ; John Joseph Ironmonger ; Ernest Victor Emerson Andrewartha ; Reginald Gordon Sims ; Richard William Stevenson ; Alexander Henry Allan ; Harry Cartwright ; Valentine Beaconsfield Rantord ; David Wingrave Dean ; Leonard Thomas Sanderson, D.S.M. ; William Best.

Accountant Branch

Flight Lieutenant to Squadron Leader.—Ivor Letts Wincer.

Flying Officers to Flight Lieutenants.—Francis Henry Wakeford ; Frederick Cyril Chalmers ; Ronald George Dyer ; Wilfrid Arthur Wadley ; Frank Curtis Langley.

Medical Branch

Squadron Leader to Wing Commander.—Reginald Herbert Knowles, M.D., D.P.H.

Flight Lieutenant to Honorary Squadron Leader.—Charles Abercrombie Eric Innes Brownlee, M.B.

Princess Mary's Royal Air Force Nursing Service

Senior Sister (Acting Matron) to Matron.—Miss Maggie Moddrel.

Senior Sister to Acting Matron.—Miss Winifred Eveline Molesworth.

Sister (Acting Senior Sister) to Senior Sister.—Miss Bessie Cowie Simpson Forsyth.

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PUBLICATIONS RECEIVED

The Plan and Profile of a Projected Air-Line. By Prof. N. A. Rynin, Leningrad, Russia.

University of Toronto : Calendar of the Faculty of Applied Science and Engineering, 1928–1929. University of Toronto, Toronto, Canada.

Bulletin No. 7, 1927. Aeronautical Papers. By J. H. Parkin. University of Toronto, Faculty of Applied Science and Engineering, School of Engineering Research, Toronto, Canada.

U.S. National Advisory Committee for Aeronautics. Reports : No. 272.—The Relative Performance Obtained with Several Methods of Control of an Overcompressed Engine using Gasoline. By A. W. Gardiner and W. E. Whedon. *No. 279.*—Tests on Models of Three British Airplanes in the Variable Density Wind Tunnel. By G. J. Higgins, W. S. Diehl, and G. L. DeFoe. *No. 280.*—The Gaseous Explosive Reaction : The Effect of Inert Gases. By F. W. Stevens. *No. 281.*—The Effects of Fuel and Cylinder Gas Densities on the Characteristics of Fuel Sprays for Oil Engines. By W. F. Joachim and E. G. Beardsley. *No. 282.*—The Performance of Several Combustion Chambers Designed for Aircraft Oil Engines. By W. F. Joachim and C. Kemper. U.S. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

Dyke's Aircraft Engine Instructor. By A. L. Dyke. The Goodheart-Willcox Co., Inc., Chicago, Ill., U.S.A. Published in Great Britain by S. G. Gillam, Bath Road, Cowes, Isle of Wight.

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